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Outright Subsidy for the Railways

THE transfer in Mr. D. Heathcoat Amory's budget of £90 million, in respect of the expected deficit of the British Transport Commission, from below to above the line, that is, to say, expenditure which will have to be met from revenue, is the first definite admission by the Government that the railways are to receive an Exchequer subsidy outright—for the first time in the history of main-line railways in Britain. There have been many loans to railways for specific purposes. As the Chancellor of the Exchequer stated in his budget speech on Monday this step is "a sharp reminder of the harsh realities of a disturbing situation." In the calculations previously made for the coming year the Chancellor of the Exchequer included below the line £90 million for the deficit. This, he explained, embodied the cost of the recent 5 per cent interim increase in railway wages but nothing more in respect of any further increases which might result from negotiations now in progress on the Guillebaud Report. As to the advances from the Exchequer to the Commission under the Transport (Railway Finances) Act of 1957 to enable it to meet its liabilities, these have been on the assumption that the Commission eventually would achieve net receipts out of which it could both pay interest on the advances and repay the principal. Now, he stated, "it has become apparent that the prospects of the railways and the Commission are not such as to justify the continued financing of the deficit by repayable advances." The treatment of advances already made and the future capital structure of the Commission will be decided by the Government, as announced by the Prime Minister on March 10; and the necessary legislation is to be introduced next session. Whether an exception will be made of the deficit for the current year and steps taken to relate future advances to nationalised transport to sums related to some physical asset, will depend on the Government and the recommendations of the planning committee, the names of whose members are given in our personal columns. In a House occupied earlier this week with other points in the budget, the Chancellor's provision for the British Transport Commission aroused little comment. In a generally disinflationary budget the increase in profits tax is designed to encourage saving by industrial companies. Mr. Heathcoat Amory emphasised that the time might soon come when the Government would take further steps to restrain private credit.

Railway Workshop Staff

IN offering to back-date to January 11 the 5 per cent pay increase already proposed for railway shopmen, the British Transport Commission has made it clear that this award arises from the review promised with the 3 per cent increase given in July, 1958, and not from the findings of the Guillebaud Report. That report did not, and never was intended to, cover the staff of railway workshops—the Commission feels that shopmen's wages have no strong connection with those of railway workers in general and that it cannot commit itself to the inference that shopmen will receive a further increase when the Guillebaud negotiations are complete. Current basic rates of pay vary from 181s. 6d. to 190s.—the staffs are divided into sections according to their work. To take locomotive staffs as approximately medial examples, timeworkers (craft) in this section receive £9 13s. basic pay, timeworkers (unskilled) receive £8 5s., pieceworkers (craft)—the majority of the group—receive £9 4s. and pieceworkers (unskilled) receive £8 5s. Average earnings at the week ended March 21, 1959, for the same categories were as follow: £12 12s., £11 7s., £13 11s., and £11 19s.

Western Region Publicity

OUTSTANDING among the several excellent attributes of the new publicity material issued by the Western Region of British Railways is a complete absence of vulgarity together with an effective use of colour. On page 434, we illustrate five new posters and the cover of one of five area folders. These folders, which are stapled to form twelve- and eight-page booklets, are lavishly produced in colour and black-and-white and convey a great deal of information in copy which is at once interesting and intriguing. Who, for instance, knows about the villages of Nempnett Thrubwell, Crumplehorn, and Indian Queens ? Or that Pope once sourly referred to King Charles II as returning through Black Potts "laden with spoils of slaughtered gudgeons" ? Or that the incomparable Mrs. Siddons was once employed in a Georgian mansion at Guy's Cliffe ? All illustrations are large enough to give a really good idea of their subjects, and there is little doubt that the special prints which the Region has been wise enough to send to North America will be valued at least as highly as many a guidebook available only for "real" money.

Southern Region Diesel Train Heating Modified

MODIFICATIONS to improve the electric heating in passenger compartments of diesel-electric trains on the Charing Cross—Tonbridge—Hastings line of British Railways, Southern Region, were completed in time for normal services to be resumed at the beginning of this week. Under the original scheme with the heating circuits connected directly across the main traction generators, the supply to cover the nominal

installed load of 2kW. for each compartment was available only when excitation was applied for traction purposes. When the pattern of running was affected by delays for engineering work this reduced the total amount of heat below the minimum for comfort. By means of automatic controls to increase the engine idling speed and excite the generator when there is no traction load, current has been made available with the train stationary and during prolonged coasting. There is a brief delay when the driver first selects traction power during which time the temporary excitation circuit is broken and the engine returned to normal idling. To avoid dangerous overheating in compartments the single controlling thermostat has been made more sensitive by being placed in the air extraction duct.

Overseas Railway Traffics

CANADIAN Pacific Railway revenue for February amounted to $37,238,801 compared with $36,129,672 in February, 1959. Railway expenses were $35,704,253 ($35,413,348) resulting in net earnings of $1,534,548 ($716,324). Aggregate net earnings for the two months January-February, 1960, were $2,015,712 compared with $1,027,177 in the corresponding period of 1959. East African Railways & Harbours approximate railway revenue for the month of February amounted to £1,639,000, an increase of £18,000 compared with February of last year. Earnings from all sources of revenue increased with the exception of those from the inland marine, road, and miscellaneous services which fell by some £5,000. The main increase was in receipts from goods traffic which were £9,000 higher than in February, 1959; passenger and other coaching traffic increased by £6,000, and receipts from hotels and catering services by £3,000, and from livestock traffic by £4,000. Salvador Railway Company receipts for January amounted to colones 361,000 compared with colones 333,000 in January, 1959. The aggregate receipts from July 1, 1959, amounted to colones 1,576,000.

Through Sleeping Cars—Hook to Moscow

TRAVEL without a change between the Hook of Holland and Moscow will be possible on introduction of the summer timetable on May 29. Dual-gauge sleeping cars with bogies changed at the break-of-gauge station on the Polish-Russian frontier at Brest, will run between the Hook and Moscow, in connection with the Liverpool Street to Hook day service *via* Harwich; and between Paris and Moscow. The route in both cases will be *via* Hanover, Helmstedt, Berlin, Warsaw, and Minsk. The Hook-Moscow cars will be first class only, with eleven two-berth compartments, but it will be possible to travel second class throughout between London and Moscow, changing at Berlin into through Berlin-Moscow cars incorporating second class compartments. The London-Moscow journey will take some 59 hr. The through cars to be used this summer are of Russian design and construction. They will be staffed east of Berlin by the U.S.S.R. Railways. The Wagons-Lits Company will provide attendants between Berlin and the Hook and Paris. This will be the first service of through vehicles between stations in U.S.S.R. and in the West. Dual-gauge vehicles have been running for some time between Moscow and Berlin, Bucharest, and other places in Central and Eastern Europe.

Rail/Air Excursions to the Continent

THE first rail/air day excursions to be arranged by railways in this country are to be operated this season by the Great Eastern and the London, Tilbury & Southend Lines of British Railways, Eastern Region, in co-operation with Channel Air Bridge, operators of the road vehicle ferry services from Southend Airport. These will be no-passport trips from Southend to Calais. The excursions start on April 10 and end on October 31. They afford a whole day on the Continent for only £4 6s. 6d. return fare. Only one ticket is necessary, and can be bought at Liverpool Street, Fenchurch Street, and some principal stations in Essex. Combined rail/air day trips are also available to Ostend and Rotterdam, but for these destinations passports are at present necessary, though it is hoped soon to extend the no-passport facility to them. Last year the newly-introduced no-passport air excursions to the Continent from Southend Airport were a great success. This year, the railways have co-operated with Channel Air Bridge to accelerate the journey, and simplify booking. The London–Calais journey takes less than 2 hr. The Home Office announced recently that no-passport trips can last up to 48 hr., and British Railways hopes to arrange longer trips accordingly.

Under or Over the Channel

SCHEMES for rail and road routes across the Channel are proliferating. Features of the twin-bore railway tunnel recommended by study units to the Channel Tunnel Study Group were mentioned in our March 11 and 25 issues. This would cost about £100 million. A consortium of three contracting firms, Dorman Long (Bridge & Engineering) Limited, the Cie. Française d'Entreprises, and the Merritt-Chapman & Scott Corporation of U.S.A., has proposed a bridge, to include two railway tracks and a five-lane roadway, from the South Foreland, east of Dover, to near Sangatte. It would be 25 miles long, and 21 miles would be over the water. The maximum headroom would be 230 ft., to clear the largest ships. The cost would be some £200 million, and the bridge would take five years to complete. An affiliation of British, American, and French contractors is reported to have proposed a tunnel on the sea bed, for a railway only, or for a railway and road, to be completed in three-and-a-half years. The Government should bear in mind that the capacity of a railway far surpasses that of other forms of land transport, and that the cost of air freight is likely to remain higher than that of railway carriage in the foreseeable future.

Education in Road Transport

SINCE the National Committee on Road Transport Education was formed in 1945, it has exercised supervision jointly with the Royal Society of Arts over the latter's scheme of training in road transport subjects. London Transport Executive and British Road Services are represented on the committee. The primary object is to provide vocational courses for drivers, conductors, junior officials, and clerical and other indoor staff to supplement practical experience, but it also provides an introductory course for new entrants to the clerical and administrative side. Many thousands employed in both passenger and goods transport have attended classes throughout Great Britain, and most have taken the R.S.A. examinations, with a high percentage of passes, as is shown in the report for 1959. It seems that the objects of the committee are fairly generally appreciated by employers and employees on the passenger side, but that only a small minority of goods transport undertakings takes any active interest. As much of the teaching is by part-time instructors, who work during the day as officers or senior employees in road transport operators are asked to encourage their staffs to offer their services as instructors. British Railways schemes for education of railwaymen are comprehensive, but the steps taken by the road transport industry indicate a determined collective effort to increase efficiency.

Chemical Weed Control on Railways

IN an article entitled "Use of Weedex in Chemical Weed Control on British Railways," which we publish this week on pages 422-424, Mr. R. L. West, Home Sales Manager of Fisons Pest Control Limited, describes the method and advantages claimed for the use of a chemical compound especially developed for railway weed control. The compounds described are Weedex and Weedex "A," both incorporating Simazine, which has been discussed in a previous article and several features in this journal. Although Fisons are by no means the only operators in the field of railway weed control, we are publishing this article because we believe it holds interest, not only for railway systems in this country, but for administrations overseas. The close co-operation which exists between Fisons and the British Transport Commission has come into being over several years and has already resulted in the development of products, equipment, and methods especially and effectively designed for railway conditions. Co-operation and successful results of this sort should receive every encouragement for, as in the past, the railways of the world stand to gain much from the specialist knowledge and resources of outside industry.

Success of St. Pancras Diesel Services

A SHARP rise has been recorded in the number of passengers on the former Midland Railway line between St. Pancras, St. Albans and Luton, since introduction by British Railways, London Midland Region, of diesel trains on January 11. In February, the first full month since the new service began, the number of journeys by passengers using tickets other than seasons rose by 19·5 per cent compared with February, 1959, from 261,180 to 312,221. Receipts increased by 24·3 per cent. The service started badly in January, with many mechanical breakdowns, but many of the difficulties are now stated to have been overcome. The Region set out to attract additional traffic with fast and frequent trains and this policy, with the cheap off-peak fares, is evidently successful. Car parking facilities have been improved at outlying stations and many people who used to travel by motorcar are now avoiding the difficulty of parking in London by travelling by diesel train. The speed of the new service is expected to attract many people to live in outlying areas, and diesel working is effecting considerable economies.

Legislating for Palliatives

SINCE he assumed office as Minister of Transport, Mr. Ernest Marples seems to have been concerned more with traffic congestion than with an overall transport policy. After visiting the Continent and the U.S.A. he stated that " unorthodox " and even " revolutionary " plans were in preparation, and indicated that he would introduce unpopular measures if the road traffic situation demanded them. The legislation which he proposes does not live up to the expectations created. The Road Traffic & Roads Improvement Bill, to be debated on Second Reading in the House of Commons next Monday, is in effect a procedural measure, providing for speedier procedure for promulgating parking schemes and for making and enforcing traffic regulations in urban areas—all commendable objectives but unlikely to prove adequate to meet the growing congestion in cities.

Under the 1956 Road Traffic Act, which authorised charging for parking on the highway and paved the way for parking meters, the procedure was cumbersome. In London there had to be reference to an advisory committee, with an inquiry where there were objections; and before the provinces could introduce schemes Ministerial orders had to be made. The advisory committee is now eliminated and outside London greater authority is given to local authorities, with Ministerial power reduced to a veto. In making traffic regulations, responsibility in London was divided between several authorities. The Minister now assumes direct power to institute them, which gives the necessary authority for the London " traffic dictator," Dr. Charlesworth, to apply traffic engineering methods to the problem. Elsewhere local authorities are given greater powers. The door to greater experimentation is opened, as, for instance, in use of time discs for parking.

The efficacy of all traffic regulations depends on the extent of their enforcement, which cannot be effective without provision for storage of cars when not on the move. The Bill accordingly increases the authorities powers as to providing and operating off-street car parks, and, in London, empowers the Minister to pay subsidies for a strictly limited period. If more off-street parking results, the traffic wardens, the appointment of whom under police control, is authorised by the Bill, should ensure that the regulations are better observed. The ticket system, under which offenders will have the option to paying a fixed fine or taking the case to court, can then be fairly administered, though Parliament is likely to demand more safeguards against abuse. Finally, the Bill empowers the Minister to undertake road improvements in London, if the highway authorities fail to carry them out. This is a step towards the creation of a single traffic authority for the London traffic area, which the Ministry of Transport advocated in its evidence before the Royal Commission on London Government. When the legislation comes into force in the autumn local authorities will have the power to apply palliatives to traffic congestion. It is doubtful whether more can be done than keep pace with the growth in traffic, which will almost certainly be accelerated as new motorways come into use.

The Bill, therefore, is no substitute for a national transport policy. As £1,600 million is being spent on modernising the railways, the objective of such a policy should be the full employment of the railway system to ensure that sums expended produce an economic return. Expenditure on roads and railways must be co-ordinated and policy directed to the end that traffic is moved by the most convenient and economic form of transport. In the long run the greatest relief can be brought to the over-congested roads by the greater use of the railways. The longer Mr. Marples delays formulating his policy, the more difficult the solution; for once traffic takes to the roads its re-capture is unlikely. It is to be hoped, therefore, that the planning board now appointed will act with urgency and that its recommendations will be quickly considered and, if accepted, implemented without delay.

Selling Points in the Modernisation Plan

THE public which has heard and is hearing so much about the modernisation of British Railways expects to know what improvements may be expected in the conveyance of passengers and goods. There are many items in the modernisation plan as revised which can serve as selling points. The matter is comprehensively dealt with by Mr. J. Hancock, Commercial Officer, Eastern Region, British Railways, in the current issue of *British Transport Review*. Of the advantages expected from modernisation reliability, he believes, is the one the travelling public desires most, with higher speeds, comfort, and greater cleanliness. For consignors of freight the order is reliability, more flexibility in meeting requirements for door-to-door or site-to-site transport, and speed only in the context of both. For goods traffic, therefore, the sales staff look to their colleagues in the operating and technical departments for road/rail vehicles (or more containers for bulk and perishable freights), larger bulk commodity containers, and efficient handling equipment for these traffics. It is useful for railway users to know that many technical improvements will reduce operating and handling costs and in many cases, therefore, charges.

Electrification, re-signalling and other works are having their inevitable effects on services, including unpunctuality, besides some decelerations. One of the most carefully planned tasks required over the next five years is that of providing reliability during the period of transition. The ultimate benefits will be great, though that does not lighten the task of commercial representatives who must justify what takes place in the meantime.

As to improved passenger services, Mr. Hancock believes that the best selling point is suburban electrification. Turning to his own Region, he cites the success of the Liverpool Street to Shenfield scheme on the Great Eastern Line, and points out that conversion of the Great Northern Line from Kings Cross and Moorgate to Hitchin, Royston, and Hertford North may produce similar results; he mentions incidentally that it is hoped to provide a service between Kings Cross and Hitchin, 32 miles, in 30 min. Road congestion in built-up areas is likely to continue to grow, so that the high speeds of electric trains are an asset. Some people will dispute his inclusion of the Southern Region extension of electrification to the Kent coast as a suburban project, though the same considerations apply as to the Eastern Region scheme as regards frequency and speed of services. In main-line electrification, very fast trains between main centres will be essential, because of the higher speeds of motorcars to be made possible by better roads. For railway sales staff an advantage of diesel traction is that diesel trains and railcars can be, and are being, introduced all over the system, and with comparatively little delay. The travelling public can reasonably expect the placing in service of more comfortable stock on many services. Improvements to some passenger stations, especially on a large scale where the work is complex and associated perhaps with electrification, may take some time. At least the work in hand is visible to travellers. Cleanliness of station premises and of vehicles is improving, though dirt and untidiness often result from the habits of the public.

With goods traffic the advantages of electric and diesel traction, of fitting continuous brakes, and of improvements to marshalling yards, and so on, are not so obvious to railway users, though some may be interested to hear of means to increase the efficiency of goods working. They will probably show greater interest in the methods of handling consignments in goods depots. Their main concern, as Mr. Hancock stresses,

is in the availability of wagons and containers to suit the consignor's purpose. British Railways must march hand-in-hand with increasing specialisation in industry. Specialised wagons, such as pressurised cement wagons, tank wagons of various types for oil, chemicals and milk and bulk grain wagons are essential, but there is a growing need for containers, particularly for bulk movement of commodities. Among the specialised containers mention must be made of the "FM," "AF," "AFU" and "AFP" containers for frozen foods; palletisation in this last field is a new development. The mechanical engineers are within sight of a reasonably successful bulk grain container and thought is being given increasingly to special containers of suitable capacity for flour, fertilisers and chemicals. There will probably have to be containers for certain flows of coal traffic. Allied with the transfer of traffic in containers between rail and road, modernisation must include provision of suitable cranes, fork-lift trucks, and other transfer appliances. The problem of getting bulk commodities from the production point to the delivery site, is becoming more urgent. The advent of large-capacity road vehicles of 14- and 16-ton capacity which convey site-to-site has intensified competition in bulk commodities. Solutions will have to be found either with road/rail tipping vehicles, open tipping containers, or the use of hopper wagons, covered or open, which can discharge bulk commodities into open road tipping vehicles either from a raised stage or by means of a conveyor belt.

It has been estimated that the total industrial production in Britain will have increased by 65 per cent in 1970 compared with 1956. The prospects for the railways as carriers therefore are good, if they provide what is required. Mr. Hancock briefly examines the traffic potentialities of the coal, oil, iron and steel, chemical and plastics, motorcar, building, agriculture and forestry, and fish trades and industries. The prospects for coal traffic are not, he believes, as poor as some people think in view of potential consignments by rail in bulk to generating stations, distilleries, and distribution depots. All these industries may produce traffic, if efficient means to deal with it are provided. Many wagons of special types already exist for them. The urgency of the problem is shown by the fact established by the Traders' Road Transport Association, that more than half of all "C"-licensed road vehicles are specialised in use or in construction or both.

Improvements to the physical means of moving passengers and goods will be useless without appropriate charging and training of sales staff. A great deal is being done to ensure quotation of charges which are competitive. Measures include an increase in autonomy to traffic officers in quoting rates and the establishment of the costings service. Sales staff, in Mr. Hancock's view, must be given a thorough knowledge of the industries and their requirements in the district where they are serving; a good knowledge of the possibilities in the field of charging; and knowledge of the modernisation proposals, including an opportunity of talking with those who are working on some of the principal local projects. Today, when so many markets are buyers' markets the wishes of the customer have to be given the utmost consideration by the firms selling. This very often brings the receiving end of a transaction into great prominence and where important firms are concerned inter-district contact, and, if necessary, personal visits of sales staff dealing with particular streams of traffic to the receiving district need to be encouraged. With this knowledge sales staff should do their duty with assurance.

The Structure of Transport Systems

SIZE of transport undertakings is one of the considerations discussed last week by Mr. Gilbert J. Ponsonby in his paper "The Structure and Organisation of the Transport System" to the Royal Society of Arts; Mr. Ponsonby is Sir Ernest Cassel Reader in Commerce (with special reference to Transport) and Organiser of Railway Studies at the London School of Economics. The optimum size, he maintains, depends on whether or not a system of transport is desired of which cross-subsidisation, mutual financial support and the provision of unremunerative services are to be permanent features. That choice is a matter of politics, not of economics.

If, for the sake of argument, he suggests, such a system is not desired, the following considerations should be borne in mind, at least for public passenger and goods transport by road. First, there is no "most appropriate size" for the country as a whole. Each area, each locality, each "market" has its particular characteristics. In densely populated areas where frequent services are justified, very large passenger transport undertakings may be "best," but not in thinly populated rural districts, or where infrequent and irregular services only are economically justified. With goods, an extensive parcels service calls for a completely different organisation than local carrier work. Second, given a well-defined job to be done or service to be provided, the size is preferable of that undertaking which can do it at least real economic cost; but as in both the passenger and goods business quality of service is important, Mr. Ponsonby prefers the organisation, big or little, which, in the opinion of the customers, can give best value for money, *i.e.* provide the most popular type of service. In the case of railways, which normally must provide both goods and passenger services, his view affords little guidance. Outside the U.S.A. there are in most countries and largely autonomous territories (such as the States of the Commonwealth of Australia) a very few, or usually only one, major railway, often State-owned or State-controlled to varying degrees. The extent to which these can and ought to be divided into smaller viable concerns is exercising people in several countries, including Britain.

The general approach by Mr. Ponsonby to the question of the structure of transport undertakings is not for the most part what is "good" or what is "bad." Two major influences have been at work in Britain since the end of the war of 1914-18. There have been the factors of the market: the spontaneous growth of institutions such as the joint-stock company, the private company, the municipal undertaking, the partnership and the one-man business, in response to public demand expressed by willingness to pay for services rendered. Second, there is the influence of the State in determining the size, control, and the degree of monopoly enjoyed by the providers of public services. The present arrangement bears the marks of both.

During the period 1920-52, the influence of the State, reflecting a big majority of public opinion, was on the side of largeness, controlled monopoly, and, finally, centralisation. Under the Railways Act of 1921 some 121 separate railway undertakings in Great Britain were re-grouped into four companies, and even those four were to act in concert on many matters, notably on charging policy. The London Passenger Transport Act of 1933 brought together in all some 165 separate institutions. The unanimity of Parliamentary opinion in this matter is shown in the introduction of this measure by Mr. Herbert (now Lord) Morrison, then Minister of Transport in the second Labour Government, and its reaching the Statute Book under a predominantly Conservative Government with Mr. Oliver Stanley as Minister. Such was the unanimity of public opinion, Mr. Ponsonby observes, in favour of unification and the controlled monopoly. Perhaps the best example of this rejection of what he calls the machinations of the market is the section of the Road Traffic Act of 1930 which states that the Traffic Commissioners, in considering an application for a licence, must consider "the needs of the area as a whole in relation to traffic (including the provision of adequate, suitable and efficient services, the elimination of unnecessary services, and the provision of unremunerative services). . . ."

The process of enforced unification and centralisation, the deliberate creation of degrees of monopoly far in excess of anything that would have emerged without State action, reached its peak in the Transport Act of 1947. As Sir Brian Robertson, Chairman of the British Transport Commission, has put it, that Act "could scarcely be described . . . as an act of sacrilege or revolution. It is much more probable that historians will regard it, party politics notwithstanding, as a natural sequel to the course of events in the transport world in this country since the first war."

One may share Mr. Ponsonby's view that the nationalised transport undertaking is unlikely ever again to be so centralised as during the years immediately after that Act, and up to the passing of the Transport Act of 1953. He believes that by far the strongest influence leading to the Act of 1947 was the assumed desirability of a system in which by means of financial unity and bigness one form of transport could support, or be supported by, another form, in which one service, or one traffic, could subsidise, or be subsidised by, another. Degrees of monopoly and size had to be established and maintained to

enable this policy to become effective. Those sizes may not have been the most economical or " best " for the service of the many markets concerned.

The Transport Act of 1953 was in his view of greater significance. It marked a reversal of policies pursued by virtually all political parties for more than 30 years. It led to the abolition of the Railway Executive set up under the Act of 1947, and the delegation of many of its responsibilities into the six regions of British Railways, where General Managers became largely responsible to the six Area Boards. It resulted in drastic reduction in size of British Road Services, from over 40,000 vehicles to less than 15,000. Whereas the London Transport Executive remained, any further extension of the principle of such a board to other road passenger undertakings outside London, as had been envisaged under the 1947 Act, was ruled out.

The development of two branches of inland transport, road haulage and public passenger outside London are examined in the paper in some detail, with observations on the extent to which their present structures are the result of market factors or of State action. Now that the future organisation of British Railways is under review, a similar tracing of developments in the size of undertakings in the railway sphere would be of interest.

Southern Region Summer Timetables

AS usual, the first of the summer timetable books to be published is that of the Southern Region, to operate from June 18 to September 11. A novel feature is a 32-page pink inset, headed " Southern at Your Service " and illustrated with humorous line drawings. This gives much useful information on tickets, including lists of day return fares and weekly season ticket rates; party travel; baggage; meals and refreshments; Pullman cars; camping coaches; goods services; train and car ferries to the Continent, hotels; and associated bus companies. The blue inset giving details of the various Continental services also is more clearly set out than in previous issues.

In the South-Eastern Division the increased traffic attracted by the Kent Coast electrification is catered for by extra trains (in some cases from early July onwards) relieving the hourly expresses at 40 min. past each hour from Victoria. Departures will be at 8.35, 9.34 and 10.55 a.m. down, besides the 8.55, 9.55 and 10.10 a.m. of last summer, and similarly in the reverse direction. The down Saturday service will be augmented to such a degree that in the 8 hr. between 7.34 a.m. and 3.40 p.m. 30 trains will leave Victoria for Herne Bay, Margate, and Ramsgate at average intervals of 16 min., nine of them booked over the 73.9 miles from Victoria to Margate in 87 to 90 min.

An improvement has been effected in the London-Folkestone-Dover-Deal-Sandwich summary table by including the Victoria-Dover hourly electric trains via Chatham, which bridge the gaps in the Charing Cross-Dover steam services and in some cases are faster than the latter; note might also be made in this table that at some times in the day Deal and Sandwich can be reached from London quicker via Ramsgate than via Dover.

During the currency of the 1960 summer service electrification work is affecting the main-line service *via* Tonbridge and Ashford, and the through trains to and from Dover and Deal have 5 to 9 min. recovery time added to their schedules. Down trains arrive later and up trains start earlier than previously. The diesel services between Charing Cross and Hastings are unaltered.

In the services from and to Waterloo, the Havant stops introduced this Spring in the schedules of all the Portsmouth electric expresses have now been made permanent. By allowing only 25 min. for the 23.5 miles from Haslemere to Havant the addition to the time from Waterloo to Portsmouth Harbour is 1 min. only. In the up direction the overall times are unchanged.

On the Bournemouth line there are few changes. The Weymouth connection at Bournemouth Central with the 8.20 a.m. from Waterloo will reach Weymouth 17 min. earlier, at 11.28 a.m. The 7.30 p.m. from Waterloo will have a through portion for Weymouth, arriving at 12.8 a.m.

The day service to the Channel Islands *via* Weymouth will leave Waterloo at 8.27 a.m. instead of 8.20 a.m. from Paddington as last summer. From July 15 to August 26 there will be an additional service to Jersey only on Friday nights from Waterloo at 7.45 p.m., and Weymouth Quay at 12.30 a.m. Saturday, reaching Jersey at 6.30 a.m. The inward day service will reach Waterloo at 7.40 p.m., instead of Paddington at 7.32 p.m.

Certain of the Continental services via Dover will be considerably accelerated on the French side, because of electric traction between Amiens and Paris. The 9 a.m. from Victoria will be due in Paris at 4.47 p.m., 13 min. earlier; the Calais-Paris Pullman connection of the 11 a.m., now to be the " Golden Arrow," once again will not be speeded up, but the first and second class train which follows from Calais will arrive at 6.20 p.m., 28 min. earlier. The 2 p.m. service will reach Paris 7 min. earlier, at 9.33 p.m. In the reverse direction the 8.12 a.m from Paris will start at 7.54 a.m., and be decelerated by 18 min.; the 12 noon ordinary train and the 12.36 p.m. " Golden Arrow " will start 12 and 9 min. later, and arrive in Victoria at 8.5 p.m. (as now) and 7.50 p.m. (5 min. later) respectively. The afternoon service will leave Paris 33 min. later, at 2.21 p.m., but will continue to reach Victoria at 10.10 p.m., as it did last summer.

Railway Passenger Travel in 1959

(*By a correspondent*)

ON March 12 it was disappointing to learn from the first number of 1960 *Transport Statistics* that British Railways originated 20 million fewer passenger journeys in the halcyon days of 1959 than in the dismal months of 1958. Of 1,045 million journeys last year the Southern Region accounted for 39 per cent, but its bookings were down 8,653,000, or 2 per cent. The London Midland, responsible for 21 per cent of all journeys, lost only 966,000, or 0·4 per cent, of its 1958 passengers. The Western and Eastern Regions were less fortunate, with decreases around 2·5 per cent. The North Eastern had a steep drop of 2,655,000 journeys, or 4·4 per cent, and in the Scottish Region a rise of nearly 7 per cent in season ticket journeys held the fall in travel down to 961,000 journeys, or 1·4 per cent.

Last year's passenger takings totalled £141,746,000, an increase of £2,313,000, or 1·6 per cent. Of that amount first class passengers paid £15,779,000, or 11 per cent; they made 22,569,000 journeys, 2·1 per cent of the total, at an average fare of 14s. compared with the average second class fare of half-a-crown. The number of first class journeys was 809,000 more than in 1958, but 928,000 less than in 1957, so that recent efforts to develop the higher class of travel have not been entirely successful.

In 52 weeks to December 27 the railways reduced coaching train mileage by 807,000, or 0·3 per cent, to 248,841,000. Coaching steam miles were cut by 23,257,000, or 14 per cent, to 142,525,000. Diesel train-miles increased by 20,994,000, or 67 per cent, to 52,377,000, and electric train-miles were up 1,454,000, or 3 per cent, to 53,939,000.

The diesel train figures include the mileage of trains hauled by diesel locomotives and of multiple-unit diesel trains, for which 800 more vehicles were brought into service last year. Separate statistics should be published for the two types of train to give a clear picture of the work they do. Over a long term of years American railroads tried various styles of " rail motorcar trains," as they call self-propelled units made up usually of four vehicles. Their 1958 statistics of passenger train performance showed that trains hauled by diesel locomotives ran 207,328,400 miles, while multiple-unit train and railcar mileage was 27,404,100; the respective train-hr. were 4,925,900 and 946,030. Diesels propelled heavy passenger trains at 42·2 m.p.h. on an average, compared with a speed for multiple-unit trains and railcars of 29 m.p.h.

Similar details about our diesel services are not available and little attention has been paid to the high under-repair percentage of the new multiple-unit vehicles. At the end of 1958 the percentage was 7·7, with 188 of 2,417 vehicles out of action. In March of last year 219 of 2,622 vehicles were under repair, making the percentage 8·3. There was an improvement in June, but at the year end 262 of 3,104 vehicles were unserviceable, raising the percentage to 8·4. Evidently a brand-new stock, of which a fifth part came into use at various dates last year, is not dependable. In contrast London Transport ran 7,366 buses and coaches on diesel oil last year and

had only 230 vehicles, or 3·2 per cent, under repair at the end of December.

For diesel-electric locomotives the position in regard to repairs was also far from satisfactory in December, 1959, when 175 of a young stock of 1,419 units, or 12·3 per cent, were unserviceable. The stock consisted of 383 train engines, and 1,036 shunting engines, but there is nothing to show how many train engines were used in passenger service or what happened to them.

This matter is better ordered in America, where particulars of diesel-electric locomotives assigned to passenger, freight, and yard service are kept separate. The 1958 number in passenger service was 1,794, of which about 7 per cent were unserviceable. The daily mileage per active passenger locomotive was 335, an advance of 50 per cent on the 1948 mileage when the diesel upsurge was gathering force. Over these 10 years assisting locomotive miles dropped from 8,286,000 to 589,500. The average 1958 passenger locomotive consisted of 2·2 diesel units and could be altered to suit operating conditions at any stage of its run.

With adequate traffic statistics and a monthly analysis of revenue and expenditure, the American railroads have proved the efficiency and economy of diesel motive power for main line operations. Its success on British Railways cannot be measured without better statistics, and particulars of net revenue earned after all expenditure is taken into account.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Quadrupling the Gt. Northern Main Line

April 4

SIR,—May I thank Mr. A. W. T. Daniel for his compliment in your April 1 issue to our present performance on the Great Northern Main Line ? For the last three months the punctuality of our expresses has been within, as near as makes no matter, the last published performance of the French.

May I then take issue with him briefly on his proposition that therefore we continue with steam traction and spend the money so saved on quadrupling the viaduct and tunnels at Welwyn ? The premise that we save money by keeping steam traction in being is wrong, as is also the premise that " electrification is further off than ever."

Yours faithfully,

G. F. FIENNES
Line Traffic Manager (Great Northern)

British Railways, Eastern Region,
Great Northern House, 79-81, Euston Road, N.W.1

Wanted—Practical Recognition

April 1

SIR,—In case the impression should be gained from the editorial note in your March 25 issue in regard to the position of salaried staff above the special class categories that the British Transport Officers' Guild is the only organisation catering for such staff, I should like to point out that the Transport Salaried Staffs' Association takes a very active part in the negotiations on their behalf, and is a party to their Joint Committee of Negotiation.

It is true that salary adjustments for out-of-category salaried staff have generally followed after adjustments for the main body of the staff, but they have not invariably followed such adjustments in the matter of percentage increases, and on two occasions claims for such equality of treatment were carried to the final stage of the negotiating machinery, reference to the chairman of the Railway Staff National Tribunal.

On the last occasion, when the Commission had offered a flat rate of £30 instead of a 3 per cent increase, the chairman's finding recognised that the review of the salary structure and salaries of out-of-category staff must be preceded by the review for the classified salaried grades and that the results flowing from the latter review must constitute one of the material factors in the review of the salary structure and salaries of the out-of-category staff. The chairman awarded a salary increase of £30 as from June 30, 1958, the date from which the 3 per cent increase in the pay of the classified salaried staff had been applied; and that any increase which might result from negotiations between the parties in the course of their review of the salary structure and salaries of the out-of-category staff should be applied from the same date upon which increases resulting from the review of the salary structure and salaries of the classified grades are made effective.

The B.T.O.G. was not, of course, party to the reference to the Railway Pay Committee of Inquiry, but now that a 5 per cent interim increase as from January 11, 1960, has been applied to the staff covered by that inquiry, application has been made by both organisations, T.S.S.A. and B.T.O.G., for a similar percentage increase from the same date for the out-of-category staff. A meeting of the Joint Committee of Negotiation to discuss the application has been arranged for April 4.

Yours faithfully,

W. J. P. WEBBER,
General Secretary

Transport Salaried Staffs' Association,
10, Melton Street, N.W.1

Railway Refreshment Rooms

April 1

SIR,—May we express doubts as to the authenticity of the illustration on page 395 of your April 1 issue, purporting to show Bletchley Station refreshment room in 1847 ?

We would suggest that in that year the bentwood chairs, the shape of the crockery, the Bass advertisement panel, and the gasoliers with either Argand or Welsbach burners were yet things of the remote future. And when was Bovril invented ? And interior photography ? No, sir ! At a guess, 1897.

Yours faithfully,

C. HAMILTON ELLIS
B. D. J. WALSH

The Railway Club,
320, High Holborn, W.C.1

Tourist Traffic Possibilities

March 13

SIR,—From reports one gathers that the Scottish Region of British Railways is the least profitable.

Eighteen months ago I took four days' holiday in the autumn and travelled almost 1,000 miles, *via* Leeds to Glasgow and over the West Highland to Mallaig, thence to Inverness and Perth *via* the Kyle of Lochalsh, returning from Dundee over the Tay and Forth Bridges and the East Coast route. The round trip ticket cost less than £8 and I had one of the happiest experiences of my life.

These lines are a wonderful tourist asset, but they are scarcely known to the great mass of people in the industrial areas of England the many who have the increasing leisure and cash to use them for pleasure. Passenger revenue could be much increased by more vigorous publicity. Why not invite a personality like Tommy Steele to travel over the route I took and write his impressions ? Plaster this all over the country. It would help the lines to live. The typical tourist would not want luxury hotels. Why not a siding full of something like camping coaches at Mallaig and other key points, offering youth hostel type of accommodation with priority for railway travellers ?

There is, or could be, a rich future for touring by rail. Each Region of British Railways has tourist assets in scenic routes which a century has made part of the landscape: diesel trains with their observation windows, and the flowers on country stations in summer. There are possibilities in trains fitted for tours lasting several days, with sleeping accommodation and television in the evenings.

Yours faithfully,

WILLIAM B. STOCKS

22 Heatherfield Road, Marsh, Huddersfield

THE SCRAP HEAP

Umbrella Roof Extension

Passengers arriving in the rain at the main passenger station at Cassel can borrow an umbrella, free, for 24 hr., as part of the German Federal Railway service. Most of the umbrellas are reported to be designed for women.

Railway Camera Club Competition

The Derby Railway Institute Photographic Society, which had defeated the Derby Co-op Camera Club in a "slide battle," tied in a recent return contest. The same slides were used, but there was another judge. The score was 235 points each.

Improvement by Stages

May I beg for a return to the stage coach ? Apart from its obvious favour, judging by Western TV ratings, it is economical and would create a badly needed aura of romance in our sad way of life. The Guillebaud report, in terms of passenger-economics, really means too much money chasing too few trains; by temperament and ability British Railways is peculiarly suited to run stage-coach services, and surely it will be a happy day if, instead of only the raucous yell of the diesel, the coachman's horn can be heard winding over the countryside ?—*From a letter to "The Times."*

Thames Tunnel Binding Chain

In the course of the rehabilitation work now being carried out at Wapping Station, on the London Transport Executive, East London Line, an iron chain has been found round the circular shaft leading down to the platforms. The shaft is one of the two original shafts of the Thames Tunnel, the first tunnel for public traffic ever to be driven beneath a river, built between 1825 and 1843 by Sir Marc Isambard Brunel. Both shafts were built with stairways for pedestrians, but the inclined approaches which were to have allowed wheeled traffic to use the tunnel were never built and it was not used by vehicles until, after purchase by the East London Railway in 1865, trains started to run through it in 1869.

The shafts were sunk in an unusual manner. A cast iron ring was constructed on the surface of the ground and the brickwork of the cylinder to form the shaft was built up on it above ground to its full height of 42 ft. The ground inside the cast-iron ring was then excavated and the brick cylinder descended in one piece under its own weight as the ground beneath it was cut away. The rate of descent is said to have been 6 in. a day.

The sinking process must have placed considerable strains on the newly-completed brickwork, and contemporary accounts state that the cylinders were "rigidly braced" to help them withstand the stresses involved. It seems probable that the chain recently discovered was placed round the exterior of the brick cylinder, before the lowering process began, to strengthen it as it descended into the ground. There may well be other similar chains round the shaft at other levels. The chain is of iron and is in reasonably good condition after its 120 years in the earth. It is made up of 6-in. links forged from 1¼-in. dia. bar.

Railway Centenary Stamps

The South African Post Office is to issue a special stamp on May 2 to mark the railway centenary. The design shows

Stamp to commemorate South African railway centenary

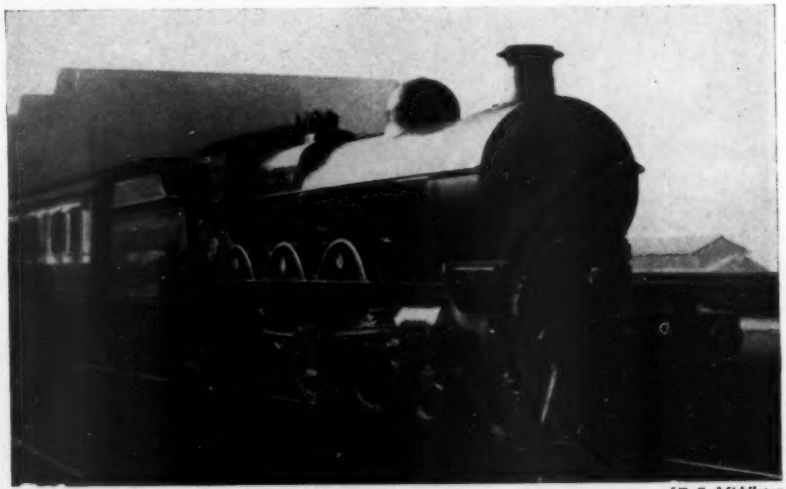
locomotives of 1860 and 1960. Two other railway centenaries have been featured in stamps of other countries of the British Commonwealth: India in 1953 and Australia the following year. The stamps featured old and new types of locomotives to exemplify a century of progress. The United States Post Office maintains its commemorative issues. The 75th anniversary of the completion of the first transcontinental railroad was commemorated in special issues in 1944. and the 125th anniversary of the charter of the Baltimore & Ohio Railroad in 1952. In the latter case the stamp showed three stages in the development of American railways: the horse-drawn wagon, the *Tom Thumb* steam locomotive, and a modern diesel. Railway "engineers" (engine drivers) had their own stamp in 1950, including a portrait of Casey Jones.

Fish Heads by Rail

Oft despised fish heads have now become so important that they are being railed 1,441 miles from Port Augusta in South Australia to Fremantle in Western Australia. Because of the extensive crayfishing operations in Western Australian waters, local crayfish baits, such as sheeps heads, fish heads, and various offal, have become very scarce. Supplies of kangaroo meat, also used for this purpose, have become very limited, because of the popularity of the meat for pets foods. To keep the crayfish pots baited, each week, nine tons of tuna heads are snap frozen in Port Augusta, South Australia and railed the 1,441 miles to Fremantle. The fish heads are kept fresh in insulated rail wagons and delivered in three days.

Early Days on the G.C.R. Main Line

Recent drastic reduction of express passenger services on the main line of the former Great Central Railway has prompted a correspondent to send us the photograph, taken in 1905 or 1906, of a G.C.R. 4-6-0 at Sheffield Victoria, at the head of the 3.20 p.m. express to Marylebone. At that time, only five or six years after the opening of its extension to London, the G.C.R. was active, with Mr. (later Sir) Sam Fay, as General Manager, in promoting passenger traffic by operating fast services, including the 2-hr. 50-min. schedule of the 3.20 p.m. from Sheffield. Buffet cars, as illustrated on page 393 of our April 1 issue, were run in some trains, an amenity featured prominently by the company in its advertising. The fastest time today from Sheffield to London is 2 hr. 45 min., over the Great Northern route from Sheffield Victoria to Kings Cross, by the "Master Cutler" all-Pullman trains.



Photo] [*F. S. Middleton*

Great Central Railway express about to leave Sheffield Victoria for Marylebone in 1905 *or* 1906 *on 2-hr. 50-min. schedule*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Coal by Rail in 1959

The overall quantity of coal moved from the collieries by rail by the South African Railways during 1959 was 21,471,135 tons, a drop in comparison with 1958 of 80,679 tons. Railings from Transvaal collieries at 17,823,226 tons improved by 32,549 tons, but in the case of Natal, the total of 3,647,909 tons was 113,228 tons less than during 1958. Coal railed for local consumption, including power stations, from all collieries amounted to 15,667,339 tons, 590,094 tons more than during 1958, but coal supplied for shipment purposes, including export and bunkers, amounted to only 36,723 tons, or 10,088 tons less than the previous year.

INDIA

Third Class Sleeper Services

Sleeping accommodation without any surcharge in newly built coaches for third-class passengers travelling over 500 miles is to be introduced on some more trains, from dates to be announced by the railway administrations concerned in due course. A daily sleeping coach service is to be introduced on the Howrah-Delhi express, Bombay-Madras mail, Ahmedabad-Delhi express and Poona-Bangalore mail as well as the express train running between Barauni and Amingaon. The sleeping service will also be provided on the Howrah-Dehra Dun weekly Janata express. In each case, the sleeping coach will run in both directions.

The Railway Board has advised the railway administrations that berths in these coaches falling vacant en route, and not expected to be required for passengers travelling for over 500 miles, may be made available to passengers at intermediate stations even if they hold tickets for less than 500 miles, but on payment of the usual surcharge of Rs.3 per night. Such new third class sleeper coaches for passengers travelling over 500 miles are already in service on the Madras-Howrah mail and the Delhi-Bombay Central Janata express.

WESTERN AUSTRALIA

New " Westland " Trains

The Government of Western Australia has approved the calling of tenders for two " Westland " passenger trains for use on the Western Australian section of the overland link between Perth and the capital cities of Eastern Australia. Tenders will be called throughout Australia, but they will provide that the trains must be made in Western Australia. The first of the trains could be operating within 18 months to two years, and the second shortly afterwards. In announcing the Government's decision the Minister for Railways, Mr. C. W. Court, said that although certain basic specifications would be provided, tenderers would be allowed scope for submitting their own design to ensure that it was the most modern possible.

The trains would be air-conditioned by axle-driven equipment self-contained in each car. A breakdown in the air-conditioning and lighting of one carriage would not mean a complete failure. The decision to air-condition the train is in keeping with the modern trend for this facility in long-distance trains in Australia and the world, and will avoid dissention through passengers transferring at Kalgoorlie from the Commonwealth Railways air-conditioned train to non-air-conditioned trains on the Western Australian section. The Minister said that the construction of the trains would help boost the engineering industry in Western Australia.

VICTORIA

Car Parks at Stations

Free car parking areas for rail patrons at many metropolitan railway stations have become so popular that more are being planned and extensions and improvements to some already in use have been carried out. The original car park at the Foster Street entrance to Dandenong Station was too small to cope with the demand for parking space, and it had been necessary to provide additional accommodation for about 80 cars in another area with an entrance from Station Street. Plans are also under consideration to provide further car parking space in the vicinity of the station. The Surrey Hills Station free car parking area had also been improved and more space provided.

SYRIA

Rail Project Inaugurated

A £40,000,000 railway project to link the port of Latakia, 100 miles south-west of Aleppo, with the rest of Syria, was inaugurated at Voudehi recently by President Nasser. He tightened the first bolt of the track to start five years of work. It is estimated that £16,000,000 of foreign capital will be needed to carry out the full plans. The first section of the railway will run from Latakia to Aleppo. Then it will be extended to Deir-ez-Zor and Kamishli. Subsequently, if political difficulties with Iraq are resolved the railway will be taken to Baghdad.

Russia is stated to be ready to provide equipment and materials under credits already granted, but no decision has yet been taken. Other countries interested in the project are West Germany and Belgium. It is estimated that traffic will reach 1,000,000 tons a year after the first section has been operating for 12 months. It should increase to 2,000,000 tons annually after five years.

ARGENTINA

1,000th G.E. Diesel for South America

Members of the Argentine press, government and railway officials recently completed an inaugural run in a small two-car train hauled by the 1,000th

Guests inspecting the 1,000th G.E. diesel-electric locomotive for South America before the inaugural run to Del Viso, General Belgrano Railway

diesel-electric locomotive built by the International General Electric Company of Erie, Pennsylvania, for use in South America. The 1,320 h.p. locomotive left the Buenos Aires terminal of the General Belgrano Railway and travelled to Del Viso, some 35 miles from the capital. The locomotive was one of the 50 recently ordered by the General Belgrano Railway.

UNITED STATES

Railway Mergers

The protracted legal proceedings which have held up the bid of the Pennsylvania and Atchison, Topeka & Santa Fe Railroads jointly to purchase the Toledo, Peoria & Western Railroad, and which eventually were carried to the United States Supreme Court, at last have ended in favour of the two former railways.

The T.P. & W. is an important bridge line to the south of Chicago, extending for 206 miles from Effner, to the south-east, where junction is made with the Pennsylvania, to Lomax, in the south-west, where the Santa Fe is joined, and also to Keokuk and Warsaw. Intermediately, the T.P. & W. has connection with all the important main lines running east, south and west from Chicago, and therefore is able to keep much through freight traffic clear of Chicago.

The interstate Commerce Commission also has approved a merger of the 343-mile Charleston & Western Carolina Railway with the Atlantic Coast Line, which has held the majority of the former's stock since 1897.

Chicago Suburban Service

When Mr. Ben Heineman became President of the Chicago & North Western Railway, in 1956, that company was losing about $2,000,000 a year on operating its Chicago suburban services. Some 80,000 passengers are carried daily from and to 74 stations, and up to 1956 they were accommodated in elderly coaches hauled by steam locomotives.

The retiring management had ordered 48 double-deck coaches of the gallery type, and had assigned some diesel locomotives to the service. Since then the total of gallery cars has been increased to 84, which are diesel-operated on a push-and-pull basis; and the attractiveness of the service, has so increased custom that with the economy effected by diesel operation and some increase in fares the deficit has been wiped out.

The prospect is so encouraging that the C. & N.W. has ordered 116 more gallery cars, to bring the total to 200, and 45 existing diesel units will be adapted for push-and-pull working, at a total cost of $21,000,000. The intention is to work 10-coach push-and-pull trains, each with 1,600 seats and air-conditioned. A life insurance corporation is financing the new rolling stock.

SPAIN

Madrid-Barcelona Talgo Service

The new thrice-weekly service between Madrid and Barcelona of the Talgo diesel-hauled articulated train, to which reference was made in our February 12 issue, is proving very popular. The only intermediate stops are at Saragossa, Reus, and Tarragona.

ITALY

Rail Link with New Airport

A branch is to be built to provide rail connection between Rome and the airport of Fiumicino, which is to be brought into operation this summer. The journey time between Rome Termini and the airport by electric train will be 26 min., against 50 min. by road. Traffic at Fiumicino, is expected to amount to 6,000 passengers a day, including transients. Work associated with provision of the rail service to the airport includes doubling part of the existing Rome-Fiumicino line and installation of automatic signalling.

Level Crossing Warnings

Half-barriers with flashing red warning lights are being installed at further level crossings. The barriers and lights are actuated by track circuits and pedals or through pedals operating other electric connections.

Cheques Accepted at Stations

Cheques guaranteed by banking houses are now accepted at State Railways goods depots and passenger station booking offices in payment of any amount, more particularly in forwarding or clearing freight consignments.

WESTERN GERMANY

Railway Traffic Association

In accordance with an agreement between the Federal Railway and privately-owned railway undertakings, the German Railway Traffic Association (D.E.V.V.) has resumed its activities. It was founded in 1886 with the special object of ensuring uniformity and general efficiency in the methods of charging for and consigning freight and in accountancy and payments between German railways. After the war of 1939-45 the duties of the D.E.V.V. were assigned to a "delegate authority," and have only recently been taken over by the Association on its re-creation.

Publications Received

Bernco Products.—An illustrated brochure produced by Bernard Collins Limited features some of the firm's products. The railway signal equipment depicted includes a control desk; electronic control console and telephone desk; telephone cabinet; wall panel cabinets, large and small; all-aluminium cases and apparatus; Fibalite test case; all-aluminium lineside equipment case, as supplied to British Railways; and signal location case with signal posts, mounting brackets and so on, and track feed cases as used by the London Transport Underground. Amongst other products shown are light- and medium-range pressings in ferrous and non-ferrous metals, and steel heater cover plates as fitted to British Railways rolling stock. Copies may be obtained from Bernard Collins Limited, 86-87 Wimpole Street, London, W.1.

Metal Industry Handbook & Directory, 1959. London: Iliffe & Sons, Ltd., Dorset House, Stamford Street, S.E.1. 8¼ in. x 6 in. 568 pp. Price 21s. This standard work of reference again offers a comprehensive source of information to those connected with the non-ferrous metal industries. Information on the properties of the newer as well as more familiar metals is given, and an extensive section is devoted to the general properties of metals and alloys. More than 90 pages are devoted to general data and tables. Producers, stockists and factors of all basic metal products, metal working machinery and tools, and metal finishing equipment are listed in the Directory section. The Handbook also includes a section on electroplating and allied processes. This is the 49th year of publication.

How Avery Helps Industry.—The steps taken by W. & T. Avery Limited, to meet the demands of industry for more scientific and controlled weighing and testing systems are described in a 45-page booklet. In the first part of the booklet are illustrated some applications of the Avery Electronic Switch, which provides a means whereby operation of the scale will automatically energise or de-energise an external circuit to control any electric or electro-pneumatic mechanism. The company's latest development of automation weighing is described, and it is explained how the equipment can be used in conjunction with punched card or punched tape systems. The illustrations include a standard gauge hot-metal transporter wagon on a rail-weighbridge of 200 tons strength. Part of a new ore-handling installation in Glasgow is shown in which four scale-cars receive ore from storage hoppers, and, after weighing and totalising discharge the load into railway wagons. Copies may be obtained from W. & T. Avery Limited, Soho Foundry, Birmingham, 40.

Hotels and Restaurants in Great Britain and Ireland. London: The British Hotels & Restaurants Association, 88, Brook Street, W.1. 8¼ in. x 5¼ in. 492 pp. Paper covers. Illustrated. Price 4s. 6d. post free; 3s. 6d. from bookstalls and booksellers.—The 1960 edition, the 32nd, gives particulars of hotels and licensed restaurants which are members of the Association, in Great Britain, Ireland, and certain countries of the British Commonwealth overseas. The main section is composed of an illustration of each establishment, with a description of its size, situation, amenities offered, and full tariffs. The guide also includes a railway map of the United Kingdom and a map of the London area. Restaurants are listed separately under various towns.

Bogie Pitching

Fundamental considerations relating the effect of bogie pitching on body oscillations

By J. L. Koffman

EXPERIENCE with some recently-built coaches, railcars, and bogie locomotives has shown the presence of fore-and-aft oscillations imparted to the body when running over rail joints. In many cases these oscillations are not detracting from the ride characteristics and are scarcely detectable by passengers on well-upholstered seats. Occasionally, designs materialise with which this type of oscillation becomes unpleasant because of its violence caused by appreciable fore-and-aft accelerations. These oscillations have usually a frequency of about 4–8 cycles per sec. and, because of this, wheel unbalance is frequently cited as the cause of trouble. In such cases wheel sets have been known to be carefully dynamically balanced and the vehicles run again—without achieving improvement.* The source of excitation of these oscillations usually can be traced to the bogie pitching, *i.e.*, oscillating on the primary springs about a lateral axis(1).

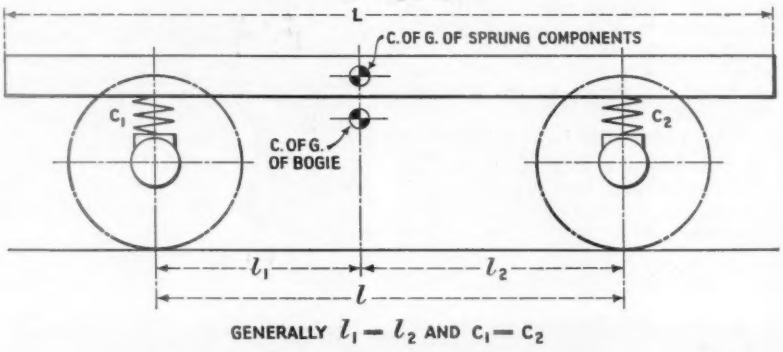


Fig. 1.—Schematic diagram of bogie elevation

This makes it necessary to gain a general appreciation of the mechanics of this mode of oscillation.

Here, the spring structure of a symmetrical trailing bogie can be likened to a beam supported by two springs. If the beam oscillates about its centre of gravity then for the simple system shown in Fig. 1:—

$$f = \frac{1}{2\pi}\sqrt{\frac{c_1 l_1^2 + c_2 l_2^2}{I}} \text{ [cycles per sec.]}$$

For most symmetrical bogies $c_1 = c_2 = \frac{1}{2}c$ and $l_1 = l_2 = \frac{1}{2}l$ so that:—

$$f = \frac{1}{2\pi}\sqrt{\frac{c\ (l/2)^2}{I}} = 0{\cdot}08l\sqrt{\frac{c}{I}}$$

[cycles per sec.]

where I [lb. ft. sec.^{2}] is the moment of inertia of the sprung bogie components about the lateral axis through the centre of gravity, and c [lb. per ft.] the spring stiffness of all axlebox springs of one bogie. The values of c are usually determined by general riding considerations (2) relating to natural frequencies and amplitudes of bouncing, pitching, and swaying of the vehicle body. In the case of locomotives incorporating certain types of quill drives the primary suspension spring stiffness is also augmented by the vertical resultant of the quill drive spring forces which, with high-power units, can almost double the stiffness of the suspension springs and this must be taken into consideration when determining the relevant frequencies and dynamic deflections (1).

Moment of Inertia of Bogies

The determination of the moment of inertia is more cumbersome because, to achieve great accuracy, it will be necessary to calculate the moments of inertia of all the major assemblies and then relate these to the centre of gravity of the complete bogie the relevant values for each group or component being:—

$$I_1 = I + mr^2 \text{ [lb. ft. sec.}^2\text{]}$$

where I is the moment of inertia of the component, m [lb. sec.^{2} per ft.] its mass, and r [ft.] the distance from the centre of gravity of the mass concerned to that of the bogie. On the other hand, analysis of test results suggests that the moment of inertia of the sprung components of conventional bogies such as frame and brake gear can be obtained with the aid of the equation relating to a beam, *i.e.*:—

$$I = mL^2/12 \text{ [lb. ft. sec.}^2\text{]}$$

where L[ft.] is the frame length.

The last equation would not apply if heavy concentrated loads such as vacuum-brake cylinders and so on are mounted well away from the bogie centre. An analysis of the data relating to some 14 coach, railcar, and locomotive bogies, the latter with axle-hung and fully-sprung motors, suggests that the radius of gyration of the complete bogie about the centre of gravity is equivalent to about 0·46 of the wheelbase while for the sprung components this ratio is about 0·4–0·45. Thus, for example, the sprung components of the standard British Railways double-bolster coach bogie weigh 5,000 lb., while the wheelbase is 8 ft. 6 in. and the spring stiffness of the four laminated axlebox springs is 109,000 lb. per ft. The magnitude of the radius of gyration is $r = 0{\cdot}45 \times 8{\cdot}5 = 3{\cdot}84$[ft.] so that:—

$$I = mr^2 = (5{,}000/32{\cdot}2) \times 3{\cdot}84^2 = 2{,}250 \text{ [lb. ft. sec.}^2\text{]}$$

and:—

$$f = 0{\cdot}08 \times 8{\cdot}5\sqrt{109{,}000/2{,}250} = 4{\cdot}75 \text{ [cycles per sec.]}$$

as compared with about 5 to 5·5 [c.p.s.] encountered in service. The pitching frequency of a number of other bogies were also calculated and the results are fairly close to experimentally-determined values. In the above case, reducing the wheelbase to 8 ft. will reduce the natural frequency of bogie pitching to 4·45 c.p.s. so that alterations here will be, within the normal limits, less effective than changes in spring stiffness.

Frame Pitching

The bogie frame can pitch approximately about its centre of gravity. The exact position of the axis of rotation is somewhat difficult to assess as in practice the motion is composed of pitching as well as bouncing, resulting in two poles about which the bogie oscillates, one within the wheelbase, the other outside it. In fact, the axis of rotation is located at a height between the centre of gravity of the complete bogie and the centre of gravity of the sprung portion, generally closer to the latter. Thus, in the case of the standard British Railways double-bolster bogie, the centre of gravity is some 4·5 in. above the centre line of the axles while the centre of gravity of the spring portion is some 8·9 in. above the centre of the axles. For the standard B.R. railcar driving and trailing bogies, these dimensions are 3·9 and 4·7, and 7·7 and 8·8 in., respectively. These magnitudes refer to the unladen bogies, becoming 3·25, 3·9, and 3·8 in. for the centres of gravity of the above complete bogies, and 5·6, 2·2; and 5 in. for the sprung parts only, when carrying the tare load, respectively. In the case of electric locomotives with axle-hung motors, the centre of gravity of the complete bogie is about 3–7 in. above the centre line of the axles, while with fully-sprung motors it can be about 5 in. With twin motors per axle located at a higher level this value can be increased to about 11 in. The centre of gravity of the sprung portion of the bogie with axle-hung motors is about 10-12 in. above the centre line of the axles. If the bogie is linked to the body at a point above or below the axis of pitching, then the resulting couple will induce forced fore-and-aft

* With coaches the dynamic unbalance of a wheel set should not exceed 100 in. ounces and the wheel eccentricity 0·010 in.

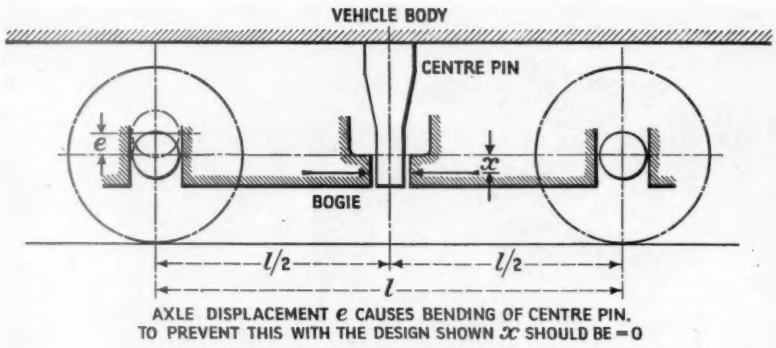
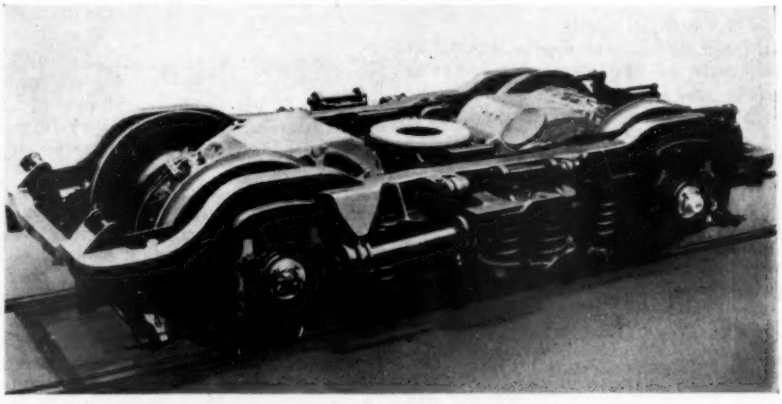


Fig. 2.—The effect of bogie pitching on kingpin stresses

oscillations of the body at the natural frequency of bogie pitching, the amplitudes of the latter becoming a maximum at the resonance speed V m.p.h. of the bogie obtained from :—

$$V = \frac{2f\,2l}{1{\cdot}467}\ \text{[m.p.h.]}$$

Thus, for the B.R. double-bolster bogie $V = 2 \times 4{\cdot}75 \times 8{\cdot}5/1{\cdot}467 = 55$ m.p.h. The value of 2 before f in the above equation is introduced because the rail joint impacts on the two wheel sets move the bogie centre longitudinally in opposite directions, so that the period of one oscillation will correspond to $2l \times 2$. With coil springs used for the primary suspension without adequate damping, the amplitudes of bogie pitching can reach undue magnitudes and cases are known when this attained 1·5 in. at resonance speed. Such high amplitudes cause undue wear of the axle guiding devices. In addition they can produce unpleasant fore-and-aft body oscillations and they can also stress rather highly centre pins which project downwards from the body to engage the bogie frame without the intermediary of a swing link bolster. In this case, bogie pitching can result in imparting appreciable bending loads as the distance *l*/2, Fig. 2, remains constant and the lateral force resulting from the displacement of the axles moving up or down relative to the bogies is taken up by the centre pin and bogie structure.



A Commonwealth bogie frame and bolster with traction bar as supplied by English Steel Castings Corpn. Ltd., for Metropolitan-Cammell multiple-unit motor coaches for South African Railways

As far as body oscillations, Fig. 3, are concerned, particular attention must be paid to attaching the bogie in the plane of the axis of pitching to eliminate the possibility of a fore-and-aft oscillation being imposed on the body. This applies regardless of the method of bogie attachment, i.e., whether check-plates or horizontal links (traction bars) are used.

The latter are effective in preventing the forcing of fore-and-aft oscillations of the body if placed in the plane of the axis of pitching, this measure being of considerable importance with rubber bolster suspension units some of which have a certain amount of freedom in the fore and aft direction, as well as with suspensions using primary helical springs deflecting in the fore and aft direction when dealing with the wheel action, but capable of oscillating at their transverse natural frequency—in this case in the vertical plane. But it should be noted that the additional lateral stiffness because of short horizontal links or rubber pads securing the bolster laterally and fore and aft to the bogie frame can reduce the effective length of the bolster swing links (3). With some designs, the bolster has been linked to brackets extending vertically from the axleboxes of one axle, thus eliminating the influence of the intermediate pitching of the bogie frame.

It should be noted here that the horizontal links securing the bolster to the bogie are stressed by traction as well as by inertia forces and the latter can reach by far the highest values in cases of sudden stopping caused by derailment or when running against buffer stops and so on.

Excessive pitching amplitudes can be reduced by damping, the magnitude of viscous damping resistance, p being given by :—

$$p = \frac{4\pi D I f}{l^2}\ \text{[lb. sec. per ft.]}$$

Since I, f, and *l* are known, it will be necessary to select a suitable value of the damping factor D to arrive at p. Generally for the primary suspension an overall value of D, including the already-present friction damping, should be about 0·4 as far as the vertical (bouncing and body pitching) oscillations are concerned (2). It is therefore necessary to aim at a damping which would meet as far as

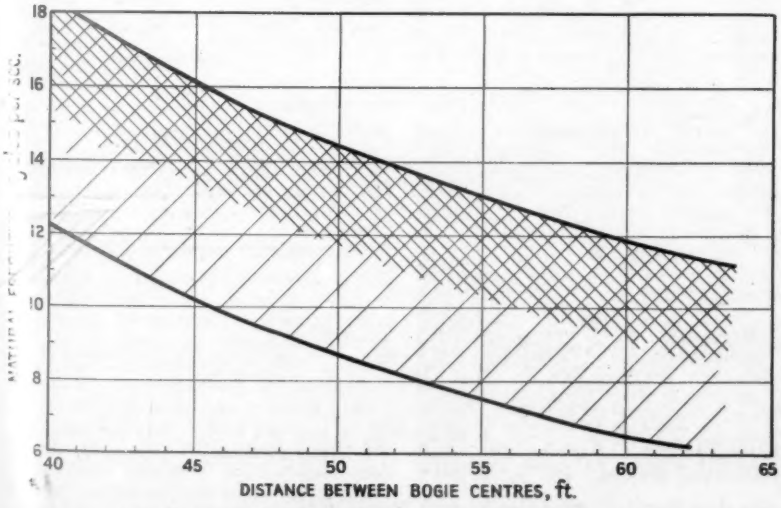


Fig. 3.—The natural vertical frequencies of coach bogies

possible, the requirements of body as well as bogie pitching. An 80-ton Bo-Bo locomotive with fully-sprung motors may be considered as an example. The body length is assumed to be 53 ft., and its weight 42 tons. The distance between the bogie centre is 29 ft., the bogie wheelbase 10 ft. 6 in., the sprung weight 13 tons, and the frame length 15 ft., while the static deflections of the primary springs is 2 in. The moment of inertia of the body about the lateral axis through its centre of gravity is :—

$$I = mr^2 \approx m(0{\cdot}23L)^2$$
$$= \frac{42 \times 2{,}240}{32{\cdot}2}(0{\cdot}23 \times 53)^2$$
$$= 420{,}000 \text{ [ft. lb. sec.}^2\text{]}$$

The moment of inertia of the sprung portion of each bogie about the lateral axis through its centre of gravity is:—

$$I = mr^2 \approx m(0{\cdot}45L)^2$$
$$= \frac{13 \times 2{,}240}{32{\cdot}2}(0{\cdot}45 \times 15)^2$$
$$= 32{,}500 \text{ [ft. lb. sec.}^2\text{]}$$

The bogie inertia must also be referred to the centre of gravity of the complete vehicle which is about $x = \sqrt{14{\cdot}5^2 + 4^2}$ = 15 ft. away from the centre of gravity of the sprung bogie mass. This increases the moment of inertia with respect to body pitching by:—

$$I = m\,x^2 = 900 \times 152$$
$$= 20{,}200 \text{ [lb. ft. sec.}^2\text{]}$$

Consequently the total inertia due to body and bogie pitching on the primary springs will be:—

$$I = 420{,}000 + 2\,(32{,}500 + 15{,}500)$$
$$= 516{,}000 \text{ [lb. ft. sec.}^2\text{]}$$

Pitching Frequency

The spring stiffness of the primary springs of one bogie is:—

$$c = \frac{13+21}{2} \times 2{,}240 \times 12$$
$$= 456{,}000 \text{ [lb. per ft.]}$$

and this is increased by the quill drive action to:—

$$c_1 = 750{,}000 \text{ [lb. per ft.]}$$

The frequency of the locomotive body and bogies pitching on the primary springs is:—

$$f_1 = \frac{1}{6{\cdot}28}\sqrt{\frac{750{,}000 \times (29/2)^2 \times 2}{516{,}000}}$$
$$= 3{\cdot}25 \text{ [cycles per sec.]}$$

As far as the motion of the sprung mass of the bogie relative to the axles is concerned, this will appear as bouncing. In addition, the sprung bogie mass will also pitch at the frequency:—

$$f_2 = \frac{1}{6{\cdot}28}\sqrt{\frac{750{,}000 \times (10{\cdot}5/2)^2}{32{,}500}}$$
$$= 3{\cdot}58 \text{ [cycles per sec.]}$$

As in this case the two frequencies are close together it will be enough to ensure sufficient damping so far as body pitching is concerned. Here, for the primary suspension the damping factor D should be about 0·4 of the critical value (in terms of body pitching and bogie bouncing) and of this about 0·1 is usually provided by axle guide friction, so that for all eight dampers of the two bogies:—

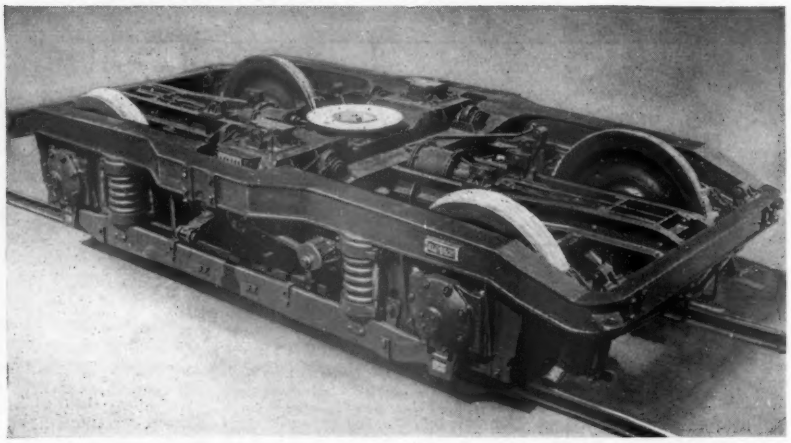
$$p = \frac{4\pi \times 0{\cdot}3 \times 516{,}000 \times 3{\cdot}35}{29^2}$$
$$= 7{,}650 \text{ or about } 1{,}000 \text{ [lb. sec. per ft.]}$$

for the damper at each axlebox, while on the basis of bogie pitching only, p=3,700 lb. sec. per ft. for the four dampers at the axleboxes of one bogie or again about 1,000 lb. sec. per ft. for each damper. The resonance speed will be:—

$$V = 2 \times 3{\cdot}58 \times 10{\cdot}5/1{\cdot}467 = 50 \text{ [m.p.h.]}$$

With large amplitudes of pitching this speed might be unacceptable as it is close to operationally-important speeds of freight service. Here unpleasant characteristics can be prevented by sufficient damping and also by de-tuning, i.e. altering the natural frequency of the bogie pitching. The latter can be achieved within certain fairly closely defined limits set by general riding performance considerations relating to body bouncing and pitching and to clearances affected by dynamic deflection. Cases are known when excessive bogie pitching amplitudes were reduced by provision of hydraulic dampers or the suspension detuned by replacing steel springs by rubber units to increase the natural frequency and also to enable benefit to be gained from the incidentally-accrued additional damping.

An interesting case is that of the latest German suburban coaches, the 85·5-ft. long bodies of which, supported by Minden-Deutz type bogies at 62-ft. 3-in. centres, had a natural vertical frequency of 6–7 cycles per sec. This was too near the natural frequency of pitching of the bogies so that it became necessary to increase the latter to 10 cycles per sec. by stiffening the primary springs, an action taken as soon as the natural frequency of the body was known (4). This case stresses the desirability of determining experimentally the natural frequency of the body and the major components such as seats and engines on their mountings with the aid of a rotary oscillator to consider as early as possible the necessity of additional damping or de-tuning the primary suspension (5).



Werkspoor bogie, Netherlands Railways, with traction bars securing bolster to bogie frame. The small fully-eliptic spring provides friction damping for helical bolster springs inside frame

Wheel Spinning

Experience with powerful electric locomotives, both Bo-Bo and Co-Co, shows that when pulling heavy loads, wheel spinning† can be encountered not only at the leading wheels of the bogies but at the following wheels as well, although these are not unloaded by weight transfer. This sympathetic spinning might be initiated as the result of spinning of the

† This action is often described as slipping. Slipping is caused by braking forces. Spinning is caused by power applied at the wheels being in excess of what can be tolerated by prevailing adhesion.

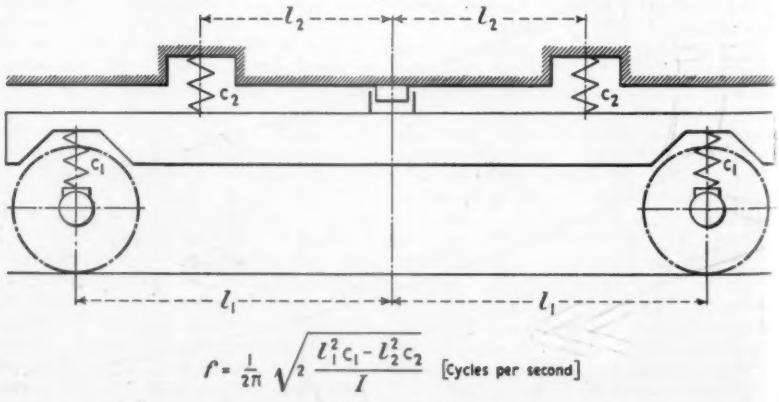


Fig. 4.—The natural frequency of pitching of a bogie, the secondary suspension of which opposes pitching

leading wheels causing oscillation phenomena and it is for consideration whether bogie pitching does not bear some responsibility here and whether a higher natural frequency of pitching would not be preferable to a low one—the former might well provide less opportunity for encouraging spinning of the rear bogie wheels.

Value of Rubber Cones

As an additional deterrent, the body suspension incorporating rubber cones placed well apart (7 ft. 8 in.) fore and aft of the middle bogie axle of the S.N.C.F. Class 7100 Co-Co locomotives and also well fore and aft of the axles of the S.N.C.F. Class 16500 B-B locomotives as evolved by Alsthom, should be helpful by increasing the natural frequency of bogie pitching and keeping the bogies " down " with the aid of the body, Fig. 4.

It will be appreciated from the foregoing that prevention of undue bogie pitching is a problem requiring careful consideration at an early design stage.

The method of attaching the body to the bogie, in the fore-and-aft direction and the height at which this is carried out will affect the riding qualities as well as the stresses imposed on the components concerned.

The natural frequency of bogie pitching as affected by inertia and spring stiffness should not coincide with that of the body structure or of major components. As far as the bogie is concerned, this can be prevented by attention to spring design. Should resonance be encountered in service it might be necessary to make use of dampers or to de-tune the system mainly by altering the suspension characteristics or to make use of both methods. Prototype bogies using helical springs should incorporate provision for dampers being fitted across the primary units.

The natural frequencies of vehicle body structures should be determined with the aid of rotary unbalance oscillators to provide information required to prevent excitation of undesirable oscillations caused by bogie pitching before going into full-scale production.

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Rail and Road Co-operation in Building Motorway

Transport of materials and equipment by British Railways and B.R.S. and storage in goods yards to afford delivery in sequence

MOVEMENT of about 1,700 tons of materials and equipment in connection with construction of the Ross Spur Motorway was effected by British Railways, Western Region, in conjunction with British Road Services. The contract for the conveyance of the traffic is reported to have been secured in the face of keen road competition. The facilities offered by British Railways were considered by the contractors, Head Wrightson Teesdale Limited, to be superior to those offered by other haulage concerns.

Materials Stored in Goods Yards

British Railways undertook to store the whole of the girders, bracings, rivets, and so on, at Tewkesbury and Upton goods yards. This has enabled the contractors to manufacture and despatch materials without holding and occupying valuable space at their works. It has also ensured availability of material, in advance, within a haul not exceeding seven miles.

Transport of girders which were beyond the maximum dimensions of consignments normally carried by rail, was carried out by British Road Services, which delivered to rail depots at destination where they were unloaded for storing until required.

Indication of Delivery Sequences

The variety of shape and size of bridging girders necessitated detailed planning of storage in the railway goods yards, as the sequence of dispatch differed from that of delivery. Girders were placed to allow delivery to be carried out in correct order, as required. This was effected by indicating on each, before dispatch from the works, a production number, a storage area number, and a delivery sequence number.

Among the equipment provided was a heavy steam crane used for unloading, placing in storage position, and subsequent reloading on to road vehicles for delivery to site. The heaviest girder weighed more than 15 tons.

For delivery from the rail depots, a 15-ton winch-fitted Foden Tractor with matching trailers was used.

Pace of Work Accelerated

Work has proceeded smoothly. At all times the workmen engaged on the project have been able to see that materials are on hand in rotation and in advance of their requirements. This has encouraged them to speed up work.

Apart from the main contract, approximately 300 tons of derrick equipment and other materials have been carried by rail for this project on behalf of the firm.

Unloading girder for motorway bridge, before storage in railway goods yard for withdrawal in sequence and road haul to site

EASTER HOLIDAY TRAINS IN LONDON MIDLAND REGION.—Nearly 1,000 extra main-line trains will run on the London Midland Region of British Railways between April 12 and 20, to cope with the anticipated Easter Holiday rush to North Wales, the North West of England and Scotland. Included in this total will be 218 additional trains into and out of Euston, and 93 to and from St. Pancras.

Use of Weedex in Chemical Weed Control on British Railways

The method and advantages claimed for the use of a chemical compound especially developed for railway weed control

By R. L. West,
Home Sales Manager, Fisons Pest Control Limited

Untreated weed infestation on Perth-Crieff line, Scottish Region, British Railways

BRITISH Railways, in line with other railways, have used sodium chlorate for a number of years, as a chemical weedkiller. This has been supplemented by hand weeding by permanent-way staff when free from other special duties. It is this dual method of control that has made the actual total cost of the operation impossible to determine precisely.

There is now considerable technical evidence to show that the newer specially-synthesised weedkilling compounds of outstanding power and persistence, such as Weedex, properly used and taking advantage of improved techniques of application, can not only control existing weed infestations without supplementary handweeding, but can prevent them arising—and at much lower cost.

The Problem

A study of how the weed problem arises should give some clue to its proper solution. Although clean stone ballast is inhospitable to weed growth, weeds do establish and, if unchecked, form a dense cover. Organic matter falls on the track and is washed into the ballast by rain. Some of it lodges and each lodgment forms the nucleus of further lodgments, progressively increasing pockets of growth potential.

Weed seeds are well equipped by nature for transportation, sometimes over long distances, and during the course of a year thousands, if not millions, of weed seeds, fall on any length of track.

The cleaner the ballast, the higher the proportion of seeds which are washed through below the germinating layer by rain. The dirtier the ballast, the greater the number of weed seeds retained in the pockets of growth potential, to germinate and establish.

It will be noticed that the formation of the pockets of growth medium and the arrival of weed seeds in them are both motivated by rain.

If an insoluble weedkiller is applied to the surface of the track, it will also be carried down by rain into the same pockets, and will be retained by filtration to become operative immediately the weed seeds begin to germinate.

It is therefore possible, using Weedex based on Simazine—a compound of low solubility (4ppm) and high stability in the soil—to spray well in advance of the growing season to *prevent* weed establishment. If preventive treatment is used on all new ballast in advance of the first growing season, the deterioration caused by vegetation can be eliminated. The lower the classification of the track, the less the maintenance—the more important chemical weed prevention.

In the cesses, the same principles apply, which are mostly surfaced with ash of varying depths. Nevertheless, growth potential is very much greater, because of proximity to source of infestation, greater area of growth potential per area as compared with stone ballast and sleepers, higher moisture, and fertile soil only a few inches down.

At present, freedom from weeds in the cesses is often governed more by the recent use of the shovel and hoe than by chemical treatment, for two main reasons. Spray trains have not always ensured an adequate spray cover in the cess and the fact has to be faced that a higher dosage rate of any chemical may be required to achieve satisfactory control.

Handweeding

It has been recognised for some years in agriculture that handweeding is more costly than chemical control, and less efficient. In fact, handweeding is only used today in circumstances where there is no suitable chemical. Admittedly, hoeing in the cesses gives immediate control of annual weeds, but it increases fertility by creating a tilth, thus encouraging quick re-infestation. On many perennial weeds, it acts as a stimulant.

The shovel, as an implement of weed

control in the cesses, is even worse. It throws the ash, the weeds and the chemical (if sprayed) down the bank, ultimately exposing more fertile soil below.

It is difficult to assess the total extent of handweeding on the track of British Railways, but it is significant that a number of trials with which we were concerned were to some extent nullified or interfered with by unauthorised handweeding. Moreover, on large-scale trials, using the Mark I Prototype Sprayer, handweeding was carried out in some miles of cess under similar circumstances.

Two conclusions can be drawn; the first, that the Weedex treatment was not always adequate in the cess; the second, that handweeding is widely used and that the weed-control results seen on British Railways are a combination of chemical control, supported by handweeding.

It has already been pointed out that the necessity of higher dosage rates, irrespective of chemical, to control heavy weed infestation in the cesses has not been put to, nor accepted by, British Railways. This does not necessarily mean that an overall increase in dosage rate is required. Modern techniques of application allow the standard dosage rate of Weedex at 10 lb. an acre to be differentially sprayed to give a lower, or preventive, dosage rate on the track, and double dosage rate in the cesses without increased cost.

Costs

When considering costs, the units of measurement to be adopted must receive first attention.

Should the chemical cost of Weedex (with dosage rate technically adjusted to the problem) be compared with chlorate put on at the standard rate irrespective of problem ? Should persistence and performance be taken into consideration, using factors of time and percentage control ? Should the cost of Weedex be compared with that of chlorate, plus the cost of supporting handweeding ?

Perhaps a review of the overall cost of weed control will help decide the yardstick of measurement to be adopted.

It is estimated that, in the total bill for weed control on British Railways, the cost of the handweeding component is at least four times as great as that for chemicals. This estimate is obviously open to challenge, but the exercise of investigating it would bring the whole question of weed contol into proper perspective.

The question for decision would appear to be whether Weedex, properly prescribed and efficiently applied, can give the desired standard of weed control without supplementary handweeding at a much lower cost than the total weedkilling bill, and is, in fact, the cheapest chemical to achieve this.

Weedex and Weedex "A"

The introduction of Weedex enables a complete re-appraisal to be made of all aspects of the weed control operation on British Railways, and offers a prospect of considerable saving in overall costs.

The change of emphasis from weed control to weed prevention is probably the most important and far-reaching development which Weedex makes possible. The proper exploitation of the chemical requires a new approach to the timing of spray programmes and to methods of application.

Weedex—based on Simazine—controls a wide range of weeds including grasses, and is the most persistent weedkiller so far evolved. It has given extremely good results in the B.T.C.-sponsored trials, and also under commercial conditions.

Starting with clean track, one treatment each year with Weedex at the appropriate time and dosage rate can prevent the establishment of weeds on both the track and the cesses.

A neglected track infested with difficult weeds, particularly in the cesses, may need a three- or four-year programme to achieve a high standard of control, during which time any handweeding should be of a nature complementary, and not antagonistic to, the chemical.

There is already evidence that it may be possible to space the treatments at 18-month or two-year intervals instead of every 12 months, but it is essential when using a new technique to get off to a good start, with a dosage rate adequate to the problem, which must also of necessity be sufficient to give a good carry-over of weedkilling power to the following season.

It is false economy to cut the initial cost by reducing the dosage rate to a marginal level which inevitably will mean that the more difficult weeds will gain ground.

It should be borne in mind that the Weedex technique is not to match the performance of chlorate, which is generally agreed not to be persistent, but to achieve an all-the-year-round freedom from weeds, independent of weather, without the support of handweeding.

For preventive treatment to be effective, the weedkiller must be in position in the rooting zone before the weeds begin to germinate or grow. To achieve this, the spray must be applied well in advance of the growing season. The low solubility of Weedex and its stability in the soil make it possible to spray at any time between October and March, which allows a sufficient period for the rain to wash it into position.

Unlike chlorate, rain is not inimical to Weedex, but is necessary to move it to the point of action.

Until the spray programme is completely revised, some track must be treated during the growing season. This also would be necessary if the principle of two treatments spread over three years, i.e., at 18-month intervals, were adopted.

Weedex "A"

For use in the growing season, Weedex "A"—based on Atrazine—is now available. The active principle is a triazine closely related to simazine, but with a somewhat higher solubility, and therefore quicker in action. Weedex "A" controls a somewhat wider spectrum of weeds than Weedex, and has sufficient persistence under average track conditions to carry forward a useful amount of weedkilling power to the following season.

The growing season extends from April to September, but it is most desirable that treatments with Weedex "A" should not be delayed beyond May or June if the

Treated and untreated sections of the Perth-Crieff line: right-hand illustration shows effect of treatment with Weedex at 8 lb./acre

full value of the treatment is to be obtained. The earlier a weed is attacked, the easier it is to kill. This is true with all general weedkillers.

To summarise: the spray programme requires to be brought forward to the period October-May/June, using Weedex from October to March, and Weedex "A" from April to May/June. This gives an annual equipment usage period of eight months against the present five months, two of which are far from ideal, biologically and economically. The spray operation can be carried out in all weathers, except snow.

The necessity for the technique of differential dosage across the section of the track—made possible by the introduction of the Mark I and Mark III prototype sprayers—to match the intensity of the weed problem, has already been explained in this and earlier articles.

Dosage Rate

There still remains the problem of knowing what dosage rate to use, and where. In our industrial work, we carry out a sizeable programme of weed treatment for the major oil companies and, in the autumn of each year, before the natural decline of vegetation, we inspect the results achieved, and make recommendations for subsequent treatment. This inspection permits an economy of chemical which could be achieved by no other means.

It is possible that a similar professional inspection on British Railways would combine a considerable saving with better results—particularly after the first year of treatment with Weedex, when advantage could be taken of its persistence to reduce dosage rates to a preventive level.

The standard dosage rate of both Weedex and Weedex "A" is 10 lb. per acre. This is intended, under conditions of average weed infestation, to give an acceptable standard of control for a period of 12 months or over.

Having achieved a high standard of control, subsequent annual dosage rates may be reduced by 20 per cent.

Acute weed problems in neglected sidings or heavily-infested cesses require up to 50 per cent more. It should be noted that, on running track, the higher dosage rate in the cess often can be obtained after the initial treatment without increasing the overall dosage rate above standard.

Stretches of track heavily infested with difficult weeds such as horsetail may require annual treatment at the standard rate for a period of three to four years. Cesses in similar condition require similar treatment, but at the higher rate.

Weedex is safe for operators; non-inflammable; non-corrosive to metals (a considerable factor in reducing maintenance costs); non-electrolyte, and does not interfere with adhesion.

It is best applied before the growing season to avoid dead residues and to retard the deterioration of ballast.

Conclusions

1. The future of chemical weed control on British Railways lies in the use of the insoluble specially synthesised compounds.

2. It is within the power of Weedex and Weedex "A" to give a high standard of weed control, both on the track and in the cesses, by single treatments at intervals of 12 months or more, without the necessity of supplementary handweeding.

3. A revision of the spray programme and the introduction of modern techniques of application will give a much better return, in terms of efficiency, on the money spent on chemical.

4. Efficient chemical weed control is cheaper than handweeding.

5. By taking full advantage of modern chemicals, improved application techniques, and scientific planning, a higher standard of weed control can be obtained at a far lower cost.

We should welcome a critical examination of the wider views we have expressed on the subject of weed control on British Railways. We should be willing to undertake any further research work necessary for the exploitation of our products and techniques and to assist in their correct implementation under commercial conditions.

Acknowledgments

We feel particularly indebted to the Chief Civil Engineer, British Transport Commission, for his support in the development of the Mark III prototype sprayer.

We should also like to take this opportunity of expressing our appreciation to the Chief Civil Engineers of all Regions for the facilities which they have given for all the trials, both large and small, on the track. We should also like to thank the British Transport Commission Working Party on Weed Control for its encouragement and help. May we also set on record the friendly co-operation we have received at all levels and at all times.

WESTERN REGION PASSENGER TRAIN SERVICE REDUCTIONS.—Because of difficulties arising from the acute shortages of key operating staff, British Railways, Western Region, curtailed some passenger services on April 4. The 12.10 p.m. from Paddington to Wolverhampton was withdrawn, and the 7.30 p.m. from Paddington to Wolverhampton now terminates at Banbury on Mondays to Fridays. The 1.58 p.m. from Banbury to Paddington also was withdrawn and the 12.20 p.m. from Wolverhampton no longer provides a service to Paddington. The 12.35 p.m. from Wolverhampton to Paddington, scheduled to run from May 2, is to be cancelled. During the period April 4 to June 11, the 2.55 p.m. train from Paddington to Swansea is to be re-timed to leave Paddington at 3.5 p.m., when it will be combined with the 3.5 p.m. train to Bristol.

MANCHESTER LONDON ROAD STATION RECONSTRUCTION—Completion of the third stage of the Manchester London Road Station reconstruction, British Railways, London Midland Region, is expected on April 23, after which diversion of the Sheffield electric service to and from Central and Victoria Stations and the stopping short of the Glossop electrics at Ashburys will cease and the normal London Road workings be restored. The next stage will involve the former London Midland side of the station, and from April 25 to June 12 considerable alteration will be required to the service between Manchester and Euston, which will be diverted to and from Manchester Victoria via Stockport and Droylsden. Of down trains the 5.50 p.m. "Mancunian" will be unaltered in arrival, at 9.50 p.m.; the 7.45 a.m. "Lancastrian" and the 9.35 a.m. "Comet" will be 6 and 4 min. later (11.56 a.m. and 1.34 p.m.), the 3.50 p.m. down 3 min. later, and other trains from London and Birmingham 12 to 16 min. later. All up express trains will start earlier from Victoria; the 9.35 a.m. "Mancunian" 8 min., the 5.45 p.m. "Comet" 17 min., the 4 p.m. "Lancastrian" 14 min., the 7.45 a.m. 19 min., and the 12 noon to St. Pancras 18 min. before their present London Road times. Up Sunday trains will start from Victoria 8 to 22 min. earlier, but certain down trains diverted from Crewe via Knutsford and Altrincham will run via Wilmslow and thus cut journey-time to Manchester.

"SALUTE TO STEAM"—A RAILWAY EXHIBITION.—A railway exhibition, organised by the Railway Correspondence & Travel Society, in conjunction with Leeds City Museum, is being held from April 23 to May 1, at the Leeds City Museum, Park Row, Leeds, 1. The exhibition will comprise a retrospective survey of railways in the North and will include models, maps, books, photographs, and historical relics, many of which have been loaned from private collections and will be on public view for the first time After an official opening at 11 a.m. on April 23 by Mr. T. H. Summerson, Chairman of the North Eastern Area Board of the British Transport Commission, the exhibition will be open daily from 10 a.m. to 6 p.m. (Sundays, 2 to 5 p.m.) until 5 p.m. on Sunday, May 1, admission free. Further particulars about the exhibition can be obtained by sending a 2d. stamped foolscap addressed envelope to Mr. A. S. Whiteley, West Riding Branch Secretary, 5, Holm Grove, Burley-in-Wharfedale, Ilkley, Yorkshire.

FRENCH DIESEL ENGINES TO BE BUILT BY M.A.K.—Société d'Etudes de Machines Thermiques (S.E.M.T.), La Courneuve, Siene, has granted a licence for building its latest diesel engine, type PA-4, to M.a.K. Maschinenbau G.m.b.H. at Kiel-Friedrichsort. The engine has been designed for railway traction applications; it has a bore and stroke of 185 x 210 mm. and develops 150 h.p. per cylinder at 1,500 r.p.m. with a brake mean effective pressure of 227 lb. per sq. in. The French licensee, Société Général de Constructions Mechaniques, which is also one of the promoters, has already standardised on production of the PA-4 engine.

SMITHY BRIDGE STATION TO CLOSE.—Smithy Bridge Station between Rochdale and Todmorden, British Railways, London Midland Region, will be closed for all traffic from May 2. Passengers will book to either Littleborough or Rochdale, according to direction of travel, and thence by buses of Rochdale Corporation or Todmorden Joint Omnibus Committee. Parcels and passenger train merchandise will be dealt with at Rochdale. Freight traffic to be accommodated in less-than-truckloads and full truckloads which require British Transport Commission cartage will be dealt with at Rochdale. Full loads of station-to-station traffic and coal class traffic will be dealt with at Littleborough.

ELECTRIC RAILWAY TRACTION SECTION

Kent Coast Electrification

ALTHOUGH considerable prominence is being given to electrification at 25 kV., 50 cycles a.c., for lines north of London, the most urgent undertaking of the Southern Region of British Railways under the British Transport Commission modernisation plan has been the extension of its 750-V. d.c. electrified lines to the Kent coast. Phase I of the scheme from Gillingham to Ramsgate *via* Faversham, the branch from Sittingbourne to Sheerness, and the line from Faversham to Dover Marine, was completed in June last year. Work is now in hand on the extensions from Sevenoaks to Dover, Ashford to Ramsgate *via* Canterbury West, Maidstone East to Ashford, and Paddock Wood to Maidstone West.

Completion of this scheme will afford complete interchangeability of stock working and electric working of all boat trains. One of the problems associated with multiple-unit operation of boat trains is the need to furnish Customs-sealed vans for registered baggage and mails between London and the quayside. To meet this requirement electric motor luggage vans have been built at Eastleigh Works, capable of running on the electrified line either singly or with a limited trailing load or attached to a multiple-unit train and also equipped with sufficient battery power to be self-propelled on non-electrified lines between stations and sidings or the quayside at Folkestone and Dover.

When all Channel ports are electrified the situation will permit the general adoption of electric multiple-unit *plus* motor luggage van operation for regular as well as relief Continental boat train services. For " The Night Ferry " and " Golden Arrow " and other trains not composed of multiple-unit stock, electric locomotives have been built, and good use is made of these for hauling goods trains. They are 2,500-h.p. Bo-Bo units designed to handle freight trains of up to 900 tons over the heavily graded routes of the South-Eastern Division of the Region, and to operate, to express schedules, fully-fitted trains of 30 or more Continental train ferry vehicles, and express trains, which may load up to as much as 700 tons. These duties demand a locomotive with good adhesion characteristics, a large number of running notches, and a fairly wide range of traction motor field weakening.

The higher speeds resulting from electrification will ensure times of boat trains and of expresses to towns in Kent to be cut, as has already been done as a result of phase I of the scheme, and no doubt services will be increased in frequency with a marked increase in traffic. One result will probably be the development of areas served by newly electrified lines, but any growth of commuter traffic to and from London will aggravate the peak-hour problem. This is compensated to some degree by the higher speeds and quicker acceleration of electric trains, which should ease the operating problem.

Of the work now in hand, there are only two stretches of track where extensive earthworks are necessary. They are between Folkestone Central and Cheriton, where the lines are being quadrupled, and between Ashford and Pluckley where one additional relief track is to be laid for two-way working. The earthworks here compare with those undertaken between Rainham and Newington, where a 2½-mile passing loop was constructed for phase I, but are nowhere near as extensive as those between Swanley and Bickley.

Platforms are being extended at Folkestone Junction and Folkestone Harbour to take 12-car trains. This work has necessitated considerable permanent way alterations. The permanent way work at Folkestone Harbour Station was completed during a seven-day possession last month during which time the old rails were removed and six turnouts, one tandem and a scissor crossing were laid in. The tracks were assembled in sections at Ashford and brought to the site by works train in the order required enabling the work to be completed with the minimum delay. Other work at Folkestone involves the reconstruction of the Central Station with two island platforms to be served by the four lines. At Ashford the marshalling yards will be modernised and the passenger station rebuilt. Down and up loop lines will be laid and carriage inspection and repair shed for electric trains constructed.

After some nine months operating experience with the electric services to Margate and Ramsgate the Southern Region has demonstrated that electric trains can provide a considerably faster, more punctual, and more frequent service than their steam equivalents. This is to the benefit of the travelling public and the railway alike and it is confidently expected that the new electrification, when inaugurated in 1962, will provide an equally effective service.

Retrospect and Prospect

AN interesting sidelight on the age of electrical science was given recently in the Eastern Region edition of *British Railways Magazine* by a contributor who recalled that Colchester was the home of the sixteenth century scholar, Dr. William Gilbert, whose work on magnetism earned him the name of " the father of electricity." If the attempt is made to trace the thread of development from Gilbert's days to the present time, a long hiatus will be found between the first applications of electricity to propulsion and the celebrated locomotive and train of Werner von Siemens at the Berlin Exhibition of 1879. Robert Davidson's battery locomotive of 1842 had a short life, being destroyed, so the story goes, by jealous rivals after he had demonstrated it on the Edinburgh & Glasgow Railway. Did it survive long enough to "convey passengers on a circular railway " at an exhibition in the Egyptian Hall, Piccadilly, as promised on a poster still to be seen at the Science Museum ? One account says its untimely end followed this public début. In any case, Davidson's locomotive was foredoomed by the bulk and weight of its primary batteries and the shortcomings of the " electro-magnetic engine."

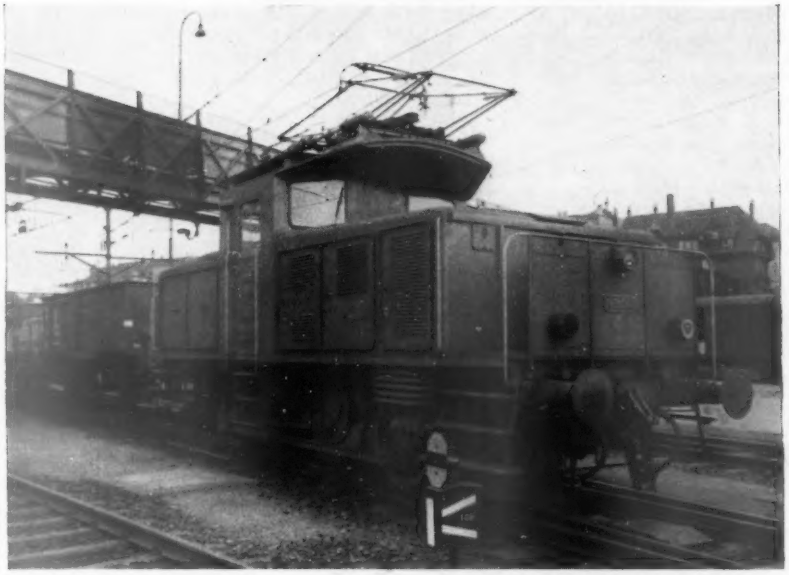
The electric traction motor as known today had a different origin and seems to have arrived almost by accident when it was observed that a stationary dynamo started to revolve when connected electrically to one which was being driven by a steam engine. Commercially, it was the advent of electric lighting which stimulated the development of practical dynamos and the storage cell and arc lamp which caused the major attention to be given to the direct current machine. Traction was something of a by-product, and books on electricity, written about the turn of the century, often say surprisingly little about it.

The past half-century saw rapid traction development in its first decade followed by a long period of consolidation. This has been succeeded by an upsurge of experiment which already seems likely to lead to more radical changes than have been seen for many years. It is not so much the 50-cycle system itself which is revolutionary, for it has been a recognised goal for long past, as the form which its equipment is taking. At first the swing to rectifiers was seen by some as a retreat from the experiments with a.c. motors, but rectifier systems themselves are evolving rapidly from the form of mere mobile substations attached to tap-changing transformers.

Schemes are now being proposed in which the rectifiers are being assimilated into the tap-changing system, taking advantage of the ease with which they may be switched from the conducting to the non-conducting state, or the small size of present-day types which enables several bridge circuits to be accommodated in a locomotive, each connected to a separate secondary winding of the main transformer. It would not be surprising, also, to find the controlled silicon rectifier developed for higher powers and applied to reducing still further the amount of conventional switchgear required. At such a time of change it is well that the earliest pioneers should be remembered. We know from contemporary evidence that Davidson named his locomotive *Galvani* after the Italian scientist who first observed and recorded the effect of an electric current produced by chemical action. One day, perhaps, the names of other pioneers may be rescued from comparative oblivion in the early pages of school text books and brought back to mind on the nameplates of electric locomotives.

Swiss Dual-Frequency Shunting Locomotives

Gas-filling in rectifiers for low-temperature operation without pre-heating



Dual-system a.c. rectifier shunting locomotive built by the Ateliers de Sécheron for the Swiss Federal Railways

TWO of the dual-frequency shunting locomotives ordered by the Swiss Federal Railways for use at junction points between the Swiss 16 2/3-cycle and French 50-cycle electrification systems were supplied by the Ateliers de Sécheron, Geneva, and are equipped with that company's pumpless rectifiers. Over 20 years' experience has now been accumulated by Sécheron in the construction and operation of mercury-arc rectifiers into which a rare gas is introduced during manufacture to allow immediate application of load in the lowest temperatures.

Operation of Rectifier

When a rectifier is cold, the pressure of mercury vapour in the tank may be too low to provide the ionisation required for the normal load current. If, in these circumstances, the load is switched on, the current will rise to a critical value at which the balance between electrons from the cathode and ions produced by collision with the molecules of gas is no longer maintained. A sharp rise in anode voltage then occurs to maintain ionisation, but with insufficient vapour present there is no corresponding increase in current. The normal neutralisation of the negative space charge at the cathode by the positive ions breaks down and the current drops sharply. At the same time the anode voltage soars to a peak which may be as high as 40kV. and an unstable condition is set up in which voltage and current oscillate between their maximum and minimum values at a frequency which may exceed 5 kc/s., under the influence of the inductances in the rectifier circuit.

The introduction of a rare gas to maintain ionisation at low temperatures was the subject of studies by a Swiss research organisation, in which Sécheron participated. This gas is chemically inert and does not combine with the metal surfaces of the tank in the manner of the residual gases released during operation of a rectifier. It is stated to have an indefinite life, and to have been detected in the tanks of rectifiers after many years of working in the open air in mobile substations. A rectifier with the gas filling, identical to those in the shunting locomotives, has been switched on to a 250 per cent overload in a temperature of −44° C. without any voltage surge, although the mercury in the tank had solidified. This is regarded as demonstrating conclusively that pre-heating is unnecessary, and that users of rectifiers with the characteristics described may bring them into operation without a warming-up period in the lowest temperatures normally experienced.

One Rectifier in Service

The shunting locomotives are equipped with two twin-anode rectifiers, but tests with one of them have shown that they can operate for long periods with one rectifier out of service. Input to the rectifiers is taken from a transformer with its primary fed from the main auto-transformer tappings through electro-pneumatic tap-changing contactors. The transformers are wound for 16 2/3 cycles and insulated for 25 kV. When operating on the latter voltage, the main and auxiliary transformer ratios are adjusted automatically by frequency-sensitive relays, taking advantage of the fact that a definite frequency, 16 2/3 or 50 cycles, is associated with each nominal line voltage, 15 kV. or 25 kV.

Direct current from the rectifiers is fed to a single six-pole traction motor with a laminated field system to reduce heating effects set up by the ripple in the supply. The ripple is proportional to the rectified voltage, and is therefore very small on the low speed notches, resulting in good commutation in spite of heavy starting currents. The motor drives the three coupled axles though a jackshaft and side rods. Manual control is used normally when passing from one supply system to the other, the driver notching back and tripping the main circuit breaker himself so that the locomotive coasts through the dead section between the two supplies. On reclosing the circuit breaker, the frequency-sensitive relays mentioned above detect the new supply and set up the transformer ratios accordingly. Electro-magnets are mounted in the track at dead sections to trip the circuit breaker automatically if the driver of a locomotive passing through such a section has omitted to do so.

Rating of Locomotives

The locomotives have a 1-hr. rating of 690 h.p., or 7 *tonnes* tractive effort at 16½ m.p.h. Maximum tractive effort at starting is rated at 13½ *tonnes*, but on trials with loads of 1,000 *tonnes*, which were started against a gradient of 1 in 133, efforts up to 18 *tonnes* were recorded in the dynamometer car. Maximum speed of the locomotives is 28 m.p.h. and weight in working order 47 *tonnes*. Ten more shunting locomotives with similar rectifiers have been ordered from Sécheron for operation at frontier points where 1,500 V. or 3,000 V. d.c. are encountered, besides those where the two a.c. systems meet. These four-system locomotives will have grid-control of the rectifier voltage. A similar control was applied last year in one of the two-system locomotives described in this article and has proved valuable in the fine control of speed required in shunting.

NEW ROOF FOR PRESTON STATION.—Work on the final stage of the reconstruction of the roof at Preston Station, British Railways, London Midland Region, is now in progress and involves the replacement of the present high roof over platforms 1, 2 and 3, by low level awnings with metal and glass covering on steel supports. The work, which is expected to be completed by January next year, will include some signal alterations and the installation of electric lighting. The new roofing has been specially designed to allow the introduction of overhead electrical equipment at some future date. The contractor is Harbour & General Works Limited, Morecambe.

Metropolitan Underground Railway of Lisbon

First section, from Sete Rios and Entre Campos to Restauradores, open to traffic

PROPOSALS for an underground railway in Lisbon had been studied for many years, but not until 1953 was its construction sanctioned by the authorities The initial stage of the first phase of the scheme was inaugurated on December 29, 1959.

This consists of two double-line routes, one starting from Sete Rios and the other from Entre Campos and converging near the Praça dos Restauradores, a busy traffic centre situated at the foot of the Avenida de Liberdade. The next stage incorporated in the first phase involves the extension of these two routes to the Rossio (Dom Pedro IV) Square, where they will be joined by another route originating in the residential area of Alvalade. Phase one will be completed by additional routes radiating from the Rossio Square, in a north-easterly direction to Madre de Deus, and in a westerly direction to Alcântara.

The new railway is laid to the standard gauge of 4 ft. 8½ in., and is entirely in tunnel. The 750-V. current for traction purposes is supplied through a third rail, with running rail return. For operating the traffic on the initial stage 12 multiple-unit trains have been built, each consisting of two all-steel motored coaches with an aggregate rating of 800 h.p. Each vehicle can carry 200 passengers, seated and standing, and is fitted with three automatic doors under the control of the guard. Because of limited station

Metropolitan Underground Railway, showing lines opened and future extensions

capacity it is not possible at present to use longer formations, even in the peak hours, although a 2½ min. headway is being maintained during such periods. The electrical equipment for these trains was supplied by Siemens-Schuckertwerke A.G., and the mechanical parts by Linke-Hoffmann Busch G.m.b.H. One class only is carried and the interior lay-out of the vehicles is based on L.T.E. practice. The stock was described in our issue of November 20, 1959.

Power Supplies

In 1955, contracts in connection with the whole of the first phase, covering the power supply, ventilating and pumping equipment, and the h.t. cabling from the Rotunda Main and Rotunda Traction substations were placed with the General Electric Co. Ltd. They were the only contracts awarded to a British manufacturer. The complete plant was commissioned in June 1959.

All the main 3-kV. and 10-kV. switchgear, the high-speed track feeder circuit breakers and the standby diesel-alternator set, are remotely controlled from the main control board in the Rotunda Main Substation. Indicating lamps show circuit abnormality and the state of switching.

Power is supplied from the National grid system at 10-kV., three-phase, 50 cycles, through two feeders, Santa Marte 1 and 2 to a seven-panel board in the Rotunda Main Substation. Two 10-kV. cables leave this board to terminate at an isolator board in the underground traction substation; two twin-cylinder rectifier equipments each rated at 1,500 kW. are installed for the 750-V d.c. traction supply.

An eleven-panel 3-kV. board in the main substation is fed through a 10/3, kV., 1,000-kVA step-down transformer and controls the supply to the six power and lighting feeders serving the various 3-kV. distribution points at the passenger stations. An 850-kVA, 3-kV. diesel-alternator set is installed which can supply a limited amount of power to the system in the event of a 10-kV. power failure, thus providing lighting at the various stations and sufficient power to enable trains to be moved to the nearest station.

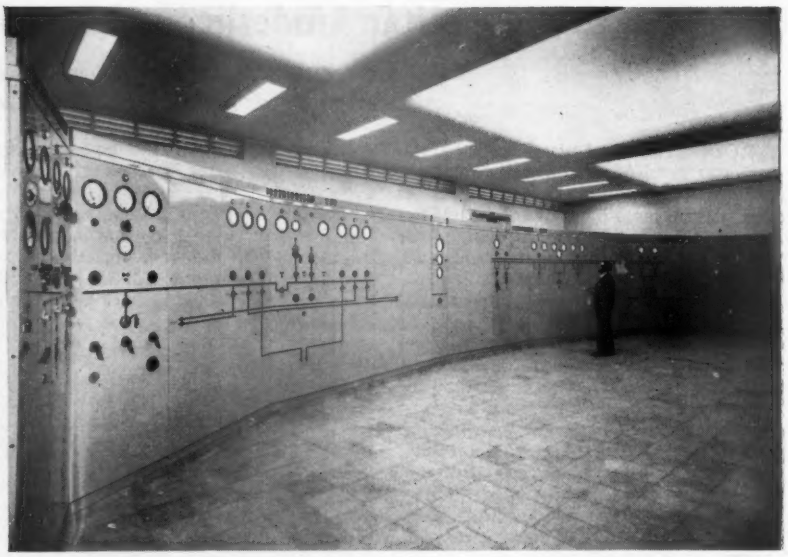
The low-voltage 380/220-V. supply at the main substation is provided by a three-cubicle switchboard which is supplied by two 120-kVA. transformers energised from the 10-kV. and 3-kV. boards respectively. A standby low-voltage feeder from the City Supply also supplies this board but interlocks prevent the public supply being paralleled with the low-voltages side of the 120kVA. transformers.

The ventilation is in two parts; main ventilation of the stations and tunnels, and independent ventilation of the electrical substations. The main ventilation is provided partly by forced-draught fresh air and partly by air drawn in through the station entrances as a result of extraction from the tunnels. At each of the stations a fresh-air supply of 17,000 cu. ft. per min. is provided by a Woods 48-in. Aerofoil two-stage contra-rotating fan. The air is ducted from the fan to outlets in the wall at the back of the platform and under the edge of the platform.

Air is exhausted in the tunnels at five points approximately midway between the stations. At each there is a 48-in. Aerofoil single-stage fan driven by a two-speed motor running at either 980 or 725 r.p.m. The air volume extracted at the higher speed is 27,000 cu. ft. per min. and at the lower speed 20,000 cu. ft. per min. The total volume of air extracted from the tunnels at the higher fan speed is 135,000 cu. ft. per min. and the total forced-draught fresh air supply is 51,000 cu. ft. per min. Thus 84,000 cu. ft. per min., representing 28,000 cu. ft. per min. at each station, flows in naturally to replace the air extracted.

The exhaust fans are installed between the tunnel roof and ground level. To prevent them being noticeably audible above ground, each is fitted with a Woods silencer which reduces the sound by about 10 dB.

In the tunnels each train functions as a piston and creates an area of low pressure or partial vacuum in its wake. This would cause air to be drawn in through the exhaust shafts were it not for a backdraught damper fitted to each fan. The damper also enables an exhaust shaft to be shut off when the fan is serviced. The high and low rate of extraction can be regulated at each station by remote control from the Stationmaster's office. The rectifiers for the railway, situated in the transformer room, are cooled by forced air supply through grilles in the



Rotunda Main Substation, showing the remote control board

Rotunda Traction Substation, showing the 750-kW. rectifier transformers

Standard-gauge train of two motor coaches, showing Scharfenberg coupling and windows of cab with left-hand drive

floor. Four different rates of air flow, from 26,000 cu. ft. per min. to 4,400 cu. ft. per min., are controlled thermostatically to maintain constant temperature under varying load conditions. The air supply is provided by two 38-in. Aerofoil fans with two-speed motors.

Pumping System

Thirteen pumping stations, with a total of 20 pumps, have been supplied to extract water drained from the track and stations and discharge it into sumps to prevent flooding. The largest pumps which are at Nò. da Rotunda have a total capacity of 3,000 litres per min. (660 gal. per min) against a head of 23 metres.

Other pumps situated at the stations are arranged to discharge direct from the sump to the municipal sewage mains some two metres below the street level. If the municipal mains are flooded, the pumps are arranged to discharge direct into the streets. All the pumps are electrode-controlled and work automatically, operations and alarms being signalled direct to panels located in the respective railway stations.

The water drained from platforms and tracks usually contains some solids, such as stones, cinders, or refuse and it has been necessary to install pumps which will pass solids without choking. "Non-Clogg" pumps, manufactured by Lee, Howl & Co. Ltd., have been supplied and the smallest of these will pass solids with a diameter of 4.5 cm.

High Tension Cabling

Pirelli-General Cable Works Limited, an associated company of G.E.C. was responsible for the supply and installation of most of the cables used in the underground railway system. These included over 2,000 metres of 10-kV. three-core cable; 13,850 metres of 3-kV. three-core cable; and 400 metres of 1 sq. in. V.R.1 positive and negative track-feeder cable.

Following L.T.E. practice, two-aspect colour-light signals with track-circuits and A.T.C. at all stop-signals are used to control the traffic. The Swedish firm of L.M. Ericsson Signalaktiebolag received the contract for the whole of this equipment. The civil engineering works were carried out by "OPCA" and "Novopca" (both local organisations); the lighting of stations and substations by Siemens-Schuckertwerke A.G.; telecommunications by Siemens & Halske A.G.; track work by Societe Generale de Traction et d'Exploitation of France; and construction of escalators by Ascenseur Otis, also of France. At Sete Rios workshops are to be erected, with equipment supplied by a number of firms, some of them British.

Second Phase of Scheme

In the second phase of the projected scheme, extensions will be built from Sete Rios to Benfica in a westerly direction, and from Entre Campos to Lumiar on the northern outskirts of the city. Further additions will consist of a circle line diverging from the Rossio-Alcântara section, passing through Praca dos Restauradores, linking up with the section between Rossio and Madre de Deus, and taken out beyond the latter point to Poço do Bispo; and an extension westward from Alcântara to Algés.

As well as providing more rapid and convenient transit from point to point, one of the main objects of the "Metropolitano" is improved co-ordination of all forms of transport within the city limits. While, for example, electric trams on routes served by underground trains are to be withdrawn, the lay-out has been planned in such a way that passengers will be able to make easy connections with those tramway services that are still retained, with the motor-omnibus network, the Portuguese Railways, and the Estoril Electric Railway.

ELECTRIFICATION IN WESTERN GERMANY.—At the beginning of March the 20-mile double-track Saarbrücken–Homburg section of the Saarbrücken–Kaiserlautern main line of the Federal Railway was opened to electric traction, but only for suburban and local traffic, the long-distance trains continuing under steam or diesel traction. This brings the total electrified length up to 3,476 route-km. (2,159 route-miles), and this 11 per cent of the total route mileage carries about 23 per cent of the total traffic. Electric locomotives and motor-coaches totalled 1,260 at the end of 1959, and further units have since been delivered. Further lines out of Saarbrucken now in course of conversion are those to Überherrn, Grossrosseln, and Stiring-Wendel, the first two being local branches, and the last-named being the German section of the main line to Metz.

A decision has been made to electrify on the single-phase 16·6-cycle 15-kV system the remaining north-south trunk line, that is, from the present system at Hanau and Gemünden to Fulda and thence to Hanover, and north from that city to Hamburg *via* Uelzen, and to Bremen and Bremerhaven, with the loop Nordstemmen–Hildesheim–Lehrte–Celle and the connecting Lehrte–Hanover line; but the Bebra–Kassel Göttongen loop is not included in the proposals. These lines total about 655 route miles, and estimated cost of conversion exceeds DM. 1,000 million, to be spread over five or six years.

INDUSTRIAL EXPANSION IN UNEMPLOYMENT AREAS.—Managing directors of 47,000 manufacturing establishments throughout Great Britain have received a letter from Mr. John Rodgers, Parliamentary Secretary, Board of Trade, informing them of special inducements to expand in the areas where unemployment is persistently high, known as Development Districts. The letter, accompanied by a leaflet called "Expanding Industry" draws attention to the provisions of the Local Employment Act which came into force on April 1. The list of Development Districts is subject to constant review and, in addition to those places already announced and listed in the leaflet, it was announced in the House of Commons on March 31, that the following areas have been included: Plymouth, Gunnislake, and Saltash; Isle of Wight; Anstruther; Dunfermline, Burntisland, Cowdenbeath, and Inverkeithing. The letter was addressed to virtually all manufacturing firms employing 25 people or more in England, Scotland and Wales; a further 50,000 copies of the leaflet will be distributed by other means. Mr. Rodgers points out that Industrial Development Certificates are readily granted in the Development Districts, where labour is plentiful and the Government have powers to help firms by providing premises or by assisting in the cost of building them. Loans and grants are also available for projects that would provide employment.

HADNALL STATION TO CLOSE.—Hadnall Station between Shrewsbury and Whitchurch (Salop), British Railways, London Midland Region, will be closed for passenger and parcels traffic on May 2. Passengers will travel to either Shrewsbury or Wem and thence by buses of the Birmingham & Midland Motor Omnibus Co. Ltd., or Salopia Saloon Coaches. Parcels and passenger-train traffic will be dealt with at Shrewsbury.

Preparing London Underground Stock for Service

Completion and tests of lightweight rolling stock at Ruislip Depot

Installing traction motor in bogie during final preparation of new lightweight power car at Ruislip Depot, London Transport Executive

LONDON Transport is taking delivery of new lightweight tube stock trains, similar to the prototype described in our October 25, 1957, issue, at a rate of two or three a month as the rolling stock replacement scheme gets into full swing. Seventy-six of these light-alloy-clad seven-car trains are on order; they are being built by the Metropolitan-Cammell Carriage and Wagon Co. Ltd. at its works at Saltley, Birmingham.

When the trains leave Saltley they are ready to be hauled over main-line railway tracks but they cannot be complete and ready for service on the Underground system. The essential final preparations and tests are made by London Transport engineers at Ruislip Depot.

Steam-hauled at Low Speeds

During transit a match wagon is marshalled at each end of a seven-car train; this has normal British Railways couplings at one end and a special adaptor at the other. To marshal cars with suitable couplings next to the match wagons the seven-car sets have to be coupled in a different order from that in which they will finally run in service. Because the brakes on the cars are not available for use, haulage of the train is at restricted speeds.

On arrival at Ruislip the match wagons are uncoupled and prepared for return to the car manufacturer. The cars are uncoupled and marshalled into their correct running order and shoebeams and other loose items of equipment which have been packed inside are unloaded. Three types of car—four driving and one non-driving motor car, and two trailer cars—make up a seven-car train, but much of the work to be done at Ruislip on each is similar.

The first task is to measure heights and clearances to ensure that they are still correct after the first run from the works, during which the specially developed Metalastik bolster and axlebox rubber suspension units may have settled down. The more important measurements recorded are the truck heights, the car solebar heights, axle end play, and the bogie bolster clearance.

The car is then lifted clear of its bogies to enable each of the three main constituents to be dealt with separately. On the bogies, the axlebox covers are removed and the bearings are examined. The axle itself is tested ultrasonically for faults, after which the axlebox covers are replaced. Shock absorbers and brake cylinders are examined for correct functioning and bolster clearances are given any necessary adjustment by inserting extra packing. Bogie heights are adjusted and the brake-gear is grease-lubricated.

Traction Motors Installed

The L.T.112 traction motors and gear pans are installed in both bogies of the motor cars while the car bodies are lifted clear, and the positive and negative shoebeams are fitted for which the collector shoes arrive separately, having first been fitted with connecting leads at Acton Works of London Transport.

The driving-end bogies of the driving motor cars have tripcock gear and hand-brake rigging installed at Ruislip, and there also the speedometer generator is assembled to its drive from the traction-motor armature shaft.

While work on the bogie is in progress, all pipework and conduits on the body of the car are inspected for clearance and rigidity. On completion of this work the body is lowered back on to its bogies and brake hoses and earthing wires are connected.

Adjustment of the mercury-type door interlocks ensures that, in service, the train guard is aware of any door not being properly closed. Interior details include the fixing of route diagrams and advertisement cards, and the installation of filament-type lamps and fluorescent tubes. A complete seven-car train has 84 5-ft. and eight 2-ft. fluorescent tubes, 52 filament-type lamps, and seven emergency lamps.

Each of the two trailer cars in a seven-car train carries two compressors the oil level in which must be checked. At this stage the bodies of the driving motor cars still require the mercury tube retardation controller, which is mounted behind one of the longitudinal seats instead of in the driving cab as on earlier stock. The batteries are fitted and connected and the brushes of the motor - generator - alternator are checked to ensure supplies of d.c. for control circuits and a.c. for lighting. Emergency tools and equipment are correctly stowed and the destination blinds are fitted in the boxes at the vehicle ends.

Testing Completed Vehicles

After preliminary tests on the master controller, driver's brake valve, windscreen wiper, and cab heater, the cars are coupled mechanically, electrically, and pneumatically. Further static tests then measure the insulation of all power circuits and locate the cause of any leakage of air lines or faulty door operation. All electro-pneumatic and Westinghouse brake equipment is given thorough tests in which assistance is given by a representative of the Westinghouse Brake & Signal Co. Ltd. Similarly a representative of Associated Electrical Industries Limited is in attendance to check the operation of traction equipment and all wiring.

The final stage is to test operation under power in the depot yard and on the Central Line between Ruislip and White City and to test both brake systems under service and emergency conditions. The stock is then ready to go into service.

The cycle of work from receipt of the new train to sending it to the running depot takes about eight working days. Two days are given for static tests of various types, and the trial runs last half a day. The men working on these trains include mechanical, pipe, brake, and electrical fitters, and bodymakers All are members of the Running Division for which Mr. J. Graeme Bruce, Mechanical Engineer (Running—Railways), is responsible. All the work is to the requirements of Mr. A. W. Manser, Chief Mechanical Engineer (Railways), London Transport Executive.

RAILWAY NEWS SECTION

PERSONAL

Sir Ivan Stedeford, Chairman & Managing Director, Tube Investments Limited, has been appointed Chairman of the planning board for nationalised transport. Other members are: Mr. C. F. Kearton, Joint Managing Director, Courtaulds Limited; Dr. R. Beeching, Technical Director, Imperial Chemical Industries Limited; and Mr. H. A. Benson, Partner, Cooper Brothers & Company, Chartered Accountants.

Mr. A. Dean

Appointed Assistant General Manager (Modernisation), North Eastern Region

Mr. W. H. F. Mepsted

Chief Development Officer, Southern Railway, 1958-60

Mr. A. Dean, M.Sc., D.I.C., M.I.C.E., Chief Civil Engineer, North Eastern Region, British Railways, who, as recorded in our April 1 issue has been appointed Assistant General Manager (Modernisation), York, was born in Halifax, Yorkshire. Mr. Dean was educated at Halifax Council Secondary School and Municipal Technical College, where he took an honours (1st Class) B.Sc. in Engineering. He was awarded a Royal Scholarship to the Imperial College, London, where he undertook post-graduate work at the City & Guilds Engineering College and was awarded the Diploma of the Imperial College. Continuing post-graduate research, he gained his M.Sc. (London). Mr. Dean joined the Civil Engineering Department of the Southern Railway in 1924 and after experience in various positions was, in 1939, appointed Divisional Engineer (London East). In 1942 he became Maintenance Engineer, Southern Railway, and in 1946 Assistant Chief Civil Engineer. On Nationalisation of the railways in January, 1948, he was appointed Chief Officer, Engineering (Works), Railway Executive, and in 1951 moved to the North Eastern Region as Chief Civil Engineer, the position he vacates to take up his new appointment. Mr. Dean is a Member of the Council of the Institution of Civil Engineers, a Past-President of the Permanent Way Institution and a Member of the Civil Engineering Panel of the Yorkshire Council for Further Education.

Mr. W. H. F. Mepsted, M.Inst.T., Chief Development Officer, Southern Region, British Railways, who, as recorded in our March 26 issue, retired on April 1, joined the South Eastern & Chatham Railway at Deal early in 1912. After general experience at stations, he joined the staff of the Eastern District Traffic Superintendent at Ashford, Kent, early in 1914. He served overseas with the Railway Operating Division, Royal Engineers, from 1916 to 1919, and on his return to the railway, undertook various specialised duties, including control of seasonal passenger traffic arrangements in the Paddock Wood hop-picking area and the Kent coast holiday resorts. Following the grouping of the railways, Mr. Mepsted joined the staff of the newly-appointed Southern Divisional Operating Superintendent at Brighton in January, 1924. In April, 1925, he was appointed Assistant Stationmaster, Victoria, and became Senior Assistant Stationmaster there in 1928. He was made Stationmaster, Charing Cross, in 1933, and Assistant Divisional Superintendent, London East, in 1936. He became Southern Divisional Superintendent, Southampton, in January, 1942, and while holding this appointment was a member of the Poole Harbour Commission and the Southampton Port Emergency Committee. He was appointed Assistant to the Commercial Superintendent in October, 1943, and became Assistant Commercial Superintendent three months later. In March, 1949, he was appointed Commercial Superintendent, Southern Region, a position subsequently redesignated Chief Commercial Manager. In October, 1958, Mr. Mepsted was appointed Chief Development Officer. Before nationalisation, and since, he has served on various inter-company and inter-regional conferences and committees dealing with commercial subjects. He is a member of the South Eastern Area Transport Users' Consultative Committee and a Director of the following bus companies:—East Kent Road Car Co. Ltd., Maidstone & District Motor Services Limited, Aldershot & District Traction Co. Ltd., Hants & Dorset Motor Services Limited, Wilts & Dorset Motor Services Limited.

Mr. S. A. Fitch, Assistant General Manager (Traffic), Southern Region, British Railways, has been created an Officer of the Order of the Etoile Noir, on the occasion of the State visit to Britain of General de Gaulle, President of the French Republic.

Mr. T. H. Grey has been appointed Chairman of the Rhodesia Railways Board, following the resignation of Sir Andrew Strachan. Mr. Grey has been a member of board since 1950, and Vice-Chairman since 1955. Mr.

Mr. W. C. Brudenell

Publications Officer, British Transport Commission, 1954-60

W. T. Masterton has been appointed Executive Vice-Chairman.

Mr. W. C. Brudenell, Publications Officer, British Transport Commission, who, as recorded in our April 1 issue, has retired, joined the London & North Western Railway, in 1915, in the General Manager's office at Euston. After service as an observer in the Royal Flying Corps during the closing stages of the 1914-18 war, he returned to the L.N.W.R. in the Publicity Department After experience in all phases of advertising and publicity work, Mr. Brudenell was, in 1927, made responsible for press and editorial work. In 1933, when the London Midland & Scottish Railway established its first film unit, he was placed in charge, and in 1943 became Assistant for Films & Photography. In 1948 he was appointed to the Railway Executive as Editor, *British Railways Magazine*, and in 1954 became Publications Officer, British Transport Commission.

Mr. S. Ridgway, Senior Production Assistant to the Chief Mechanical & Electrical Engineer, Swindon, Western Region, British Railways, has been appointed Locomotive Works Manager, Swindon.

Mr. C. P. Hopkins has been appointed a Director of Southdown Motor Services Limited, in the place of Mr. W. H. F. Mepsted, who has resigned.

Mr. R. S. H. Shepard, and Mr. L. B. Devins have been appointed Joint Managing Directors, Sheffield Wire Rope Co., Ltd., a member of the Firth Cleveland Group.

MALAYAN RAILWAY APPOINTMENTS

Mr. Dato Ahmad bin Perang, formerly Chairman of the Rural & Industrial Development Authority, Malaya, and a Director of Malayan Airways Limited, is acting as General Manager, Malayan Railway, during absence of Mr. E. T. Williams on leave March 27–June 2.

The following appointments are also announced: Traffic Manager, Mr. M. G. Foley; Chief Civil Engineer, Mr. J. L. Greer; Chief Mechanical Engineer, Mr. Chan Peng Khuen; Chief Accountant, Mr. E. J. Hughes (Acting); Stores Superintendent, Mr. T. H. D. Russell; Chief Port Manager, Mr. S. M. Maroof.

Mr. J. H. Collier-Wright, Chief Commercial Superintendent, East African Railways & Harbours, is on leave in this country. He attended the recent Public Services Conference at the Colonial Office, London.

Mr. D. S. M. Barrie, Vice-President of the Railway Club, and Assistant Secretary General, British Transport Commission, has been elected President of the Railway Club. He succeeds the late Mr. T. S. Lascelles.

Mr. G. C. Egwuatu, Nigerian Railway Corporation, has been elected an Associate Member of the Institution of Civil Engineers.

Sir Vincent Tewson, General Secretary of the Trades Union Congress since 1946, is to retire at the next annual Congress in September. He has had 35 years' service with the T.U.C.

Mr. J. W. Finnis, Southern Area Manager, Tank Haulage Department, Pickfords Division, British Road Services, has been appointed Tank Haulage Manager, Pickfords Division. Mr. W. A. Bridge will retire from this position later this year.

Mr. E. N. Griffith has been elected Vice-President of the British Engineers' Association. He has served on the Governing Council of the Association for the past 10 years.

Mr. John Booth has been appointed to the board of the Central Wagon Co. Ltd., Wigan, as Sales Director.

Mr. Frederick Cavendish Winfield has retired from the partnership of Messrs. Merz & McLellan. He has agreed to continue with the firm as a Consultant.

The board of directors of Telcon Metals Limited, the newly-formed company referred to in the Notes & News section this week, is as follows: Chairman, Mr. W. C. Handley; Deputy Chairman & Managing Director, Mr. W. F. Randall; Commercial Director, Dr. G. A. V. Sowter; Technical Director, Dr. H. H. Scholefield; Director, Mr. D. Norman-Thomas. Mr. L. D. Dodd is Secretary.

Mr. M. K. Mohiuddin, Chief Operating Superintendent, North Western Railway, Pakistan, has been appointed General Manager, Eastern Bengal Railway. Mr. R. A. Sadique, Director of Traffic, Railway Division, Ministry of Railways & Communications, Pakistan, has been appointed Chief Traffic Manager, E.B.R. Mr. A. K. Chaudry, Deputy General Manager, becomes Chief Engineer, E.B.R.

B.T.C. APPOINTMENTS

British Transport Commission announces he following appointments:

Office of the Adviser (Special Projects)

Mr. L. B. Marson, Development Officer, Traffic Department, British Railways Central Staff, appointed Assistant Adviser (Special Projects).

Manpower Department

Mr. J. P. Mead, Secretary, Railways Staff Conference, appointed Assistant Industrial Relations Officer.

Mr. F. J. T. Tuckfield, Assistant (Wages Staff). Industrial Relations Division, appointed Assistant to Director of Industrial Relations and Secretary, Railways Staff Conference.

Public Relations & Publicity Department

Mr. R. J. E. Owen, Public Relations Officer, Divisional Traffic Manager's Office, Nottingham, London Midland Region, British Railways, appointed Publications Officer, Public Relations Division.

Mr. H. R. Gomersall

Appointed Regional Planning Officer, Liverpool Street, Eastern Region

Mr. H. R. Gomersall, Planning Officer (Reconstruction), General Manager's Office, Liverpool Street, Eastern Region, British Railways, who, as recorded in our April 1 issue, has been appointed Regional Planning Officer in the same office, joined the London & North Eastern Railway in 1936. He was trained as a mechanical and electrical engineer in Doncaster Locomotive Works and at Doncaster Technical College. After further training in the Central Drawing Office and Locomotive Running Department, he entered the latter Department at Colchester in 1945. He was appointed Locomotive Shedmaster, Melton Constable, the following year and after a short period at Headquarters, became successively Locomotive Shedmaster, Cambridge and Grantham. In 1949, he returned to Eastern Region Headquarters as Assistant to Motive Power Superintendent and, in 1953, became District Motive Power Superintendent, Peterborough. In 1955, shortly after British Railways Modernisation Plan was initiated, he was appointed Planning Assistant to the General Manager, Eastern Region, and, following the establishment of a Regional Planning Office, he became Planning Officer (Reconstruction) in January, 1957, the position he has now vacated.

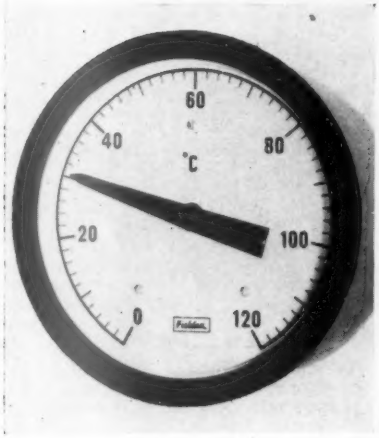
Dr. C. R. May has resigned his appointment as Area Medical Officer, London Midland Region, British Railways, on his appointment to the position of Medical Officer to the Simon Engineering Group and Simon Carves Limited.

Mr. D. W. Page has been appointed an Additional Director of Hackbridge Holdings Limited. He will act as Financial Controller and retain his appointment as Secretary.

Mr. G. E. Chilvers, formerly Manager, Westminster Bank Limited, Overseas Branch, has been appointed a Director of the P. & M. Co. (England) Ltd.

Dr. J. N. Aldington has been appointed Chairman of the London Electric Wire Co. & Smiths Limited. Mr. S. B. Klein has been appointed Managing Director. They will succeed Mr. E. L. Wildy, who has retired from both positions but remains on the board. Dr. Aldington is a Director of Associated Electrical Industries Limited, the controlling company.

NEW EQUIPMENT AND PROCESSES



Electronic Temperature Indicator

THE "Bikini" self-balancing electronic temperature indicator is a transistorsed precision instrument designed to operate with resistance bulbs. It is offered at a price comparable with that of filled systems or galvanometer equipment.

The instrument is supplied in a sealed case similar in size and appearance to a mercury-in-steel indicator or a circular scale electrical meter. The manufacturer claims it requires no more attention than does a normal electrical indicating meter.

The resistance bulbs used as the temperature-sensitive elements can be any distance from zero to 300 ft. from the instrument without affecting calibration or accuracy—an advantage made possible by a newly-developed measuring circuit. The circuit is operated at approximately 2,000 cycles per sec., and there is no trouble with mains frequency pick-up on the leads to the resistance bulb.

The indicating pointer is precisely positioned by a simple servo-mechanism. Power is provided by d.c. electric motor with sufficient torque to ensure that the smallest temperature changes are faithfully followed.

A number of standard ranges, both Centigrade and Fahrenheit, are offered within the normal limits of resistance bulbs (−200 deg. C. to +500 deg. C.), but non-standard ranges with suppressed zeros and covering temperature spans down to 50 deg. C. also can be supplied.

Calibration accuracy is 0·5 per cent of range and reproducibility is better than 0·25 per cent. No specialised knowledge is required for installation, and wiring between the instrument and the resistance bulb can follow the most convenient route. A damaged cable can be replaced without affecting calibration.

Further details can be obtained from the manufacturer, Fielden Electronics Limited, Wythenshawe, Manchester.

Aluminium Clad Steel Strip

ALREADY extensively used by the Continental motor-car, cycle, cooking utensil, and electrical industries, Feran—an aluminium clad steel strip—is now available in this country. It is claimed to combine the advantages of low cost with the strength of its steel core—the latter permits the use of thinner gauges than normally would be required in pure aluminium.

The material might be of interest to railway engineers and to manufacturers of railway equipment, for it does not corrode or form an electrolytic element; it can be anodised or treated in any other way—observing certain conditions, practically all metals can be put on it galvanically—and chromed without intermediate layer. It is 10 per cent lighter than cold rolled steel strip and requires only polishing to bring out its brilliance. It is heat- and scale-resistant; possesses favourable reflective properties and complete chemical stability, gives efficient insulation against heat and cold, good resistance to corrosion, and a high degree of protection against rust.

These properties make it a particularly good material for containers for non-acidic foodstuffs and for gaskets—the manufacturer claims that the strong steel core makes "blowing" of gaskets made from the metal practically impossible. Because of its high heat-holding capacity, Feran has been extensively used on the Continent for the manufacture of petroleum carburettors and for the burning heads of oil burners.

The diffusion of steel and aluminium is so intensive that the metals do not separate even under the severest mechanical stress—it is claimed that it is easier to destroy the steel in its entirety than to effect separation.

Further details can be obtained from the manufacturer, Wickeder Eisen-u. Stahlwerk G.m.b.H., Hauptstrasse 6, Wickede—Ruhr, Western Germany, or from the sole agents in Britain, F. W. Kubach Limited, 12, Sylvan Road, London, S.E.19.

Centrifugal Pumps

PEGSON-SULTAN vertically-split end-suction single-stage centrifugal pumps with suction branch sizes ranging from 1½ to 12 in. dia. are adaptable to many liquid-handling processes and their overall efficiency is claimed to be higher than has been achieved hitherto.

Capacities are from 20 to 3,500 gal. per min. requiring ¼—75 h.p. Only five bearing-housing groups are used for the complete range of 42 integrated units, and within each group all shafts, bearings, caps, keys, and locations for holding-down bolts are common.

Basically there are six sets of constant hydraulic shapes around which the complete range is designed. Compared with conventionally-designed pumps, the resultant interchangeability of parts makes possible relatively small spares inventories for servicing large installations.

The 3SB5 pump illustrated in cut-away form to show the simplicity of design has 3 in. branches. It is typical of the range which includes complete pumping sets with close- or long-coupled electric motors, and diesel- and belt-driven sets. Three designs of self-lubricating shaft seal and a stuffing box may be interchanged between pumps of equal shaft size. The casing may be turned to allow the discharge branch to face any one of four directions. Standard construction is in cast iron.

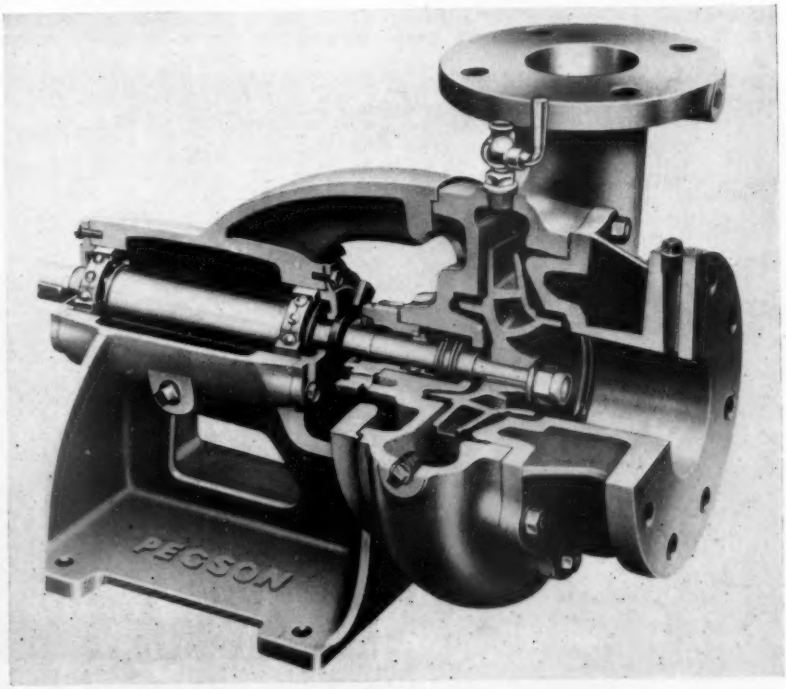
Further details may be obtained from Pegson Limited, Coalville, Leics.

Cutting Scrap Copper

THE cost of breaking copper fireboxes for scrap is claimed to have been considerably reduced by the powder cutting process.

A finely-divided iron-rich powder is conducted by compressed air or nitrogen to the reaction zone during the melting process which differs from true oxygen cutting in that it is coupled with an eroding action. The cost, including labour, is under 4s. 6d. a foot.

Further details may be obtained from British Oxygen Gases Limited, Spencer House, St. James's, London, S.W.1.



Western Region Publicity

Posters and a new series of area folders cover wide front of appeal

New posters for Porthcawl and Paignton

In last week's issue the new 12-colour Bath poster issued by the Western Region of British Railways was shown. On this page are further examples of the Region's new publicity material.

Illustrated above are two posters designed to catch the eye by amusing it. Although the bold designs reproduce well in black and white, their full effects cannot properly be assessed until the originals are seen. The Porthcawl poster, printed in 10 colours by Messrs. Hegerty & Merry, makes striking use of yellows and pinks against a background of deep blue merging into sea-green: using two fewer colours, the Paignton poster plants a strong suggestion of the sun—its tanned infant holds a red-white-and-blue playball against a chrome yellow background. Both posters carry the address of the resort's Public Relations Officer—a helpful touch for tourists.

Shown on the opposite page is one of five area folders entitled respectively: "The West Country," "The Glorious Thames," "The Shakespeare Country" (all containing 12 pages), "South Wales" and "The Cambrian Coast" (both containing eight pages).

Each folder is stapled to form a booklet. Covers are in full colour, and each page contains large illustrations in half-tone and/or line-and-colourwash, a map of the area concerned, and details and prices of available tourist facilities. The Thames map is very detailed—railway lines, river, and all towns and villages in the area are accurately marked. Included with this map are timings and mileages of river trips between Oxford and Kingston, and the dates during which these are available.

Each folder carries informative copy drawing attention to places and facts of interest, and brief reference to general passenger facilities.

All the booklets were designed by C. W. Bacon. "The West Country" was printed by the Southern Publishing Co. Ltd., of Brighton: 52,000 copies were printed for general distribution in 1960, and an additional special print of 10,000 copies was made for North America.

Seven or Eight Colours

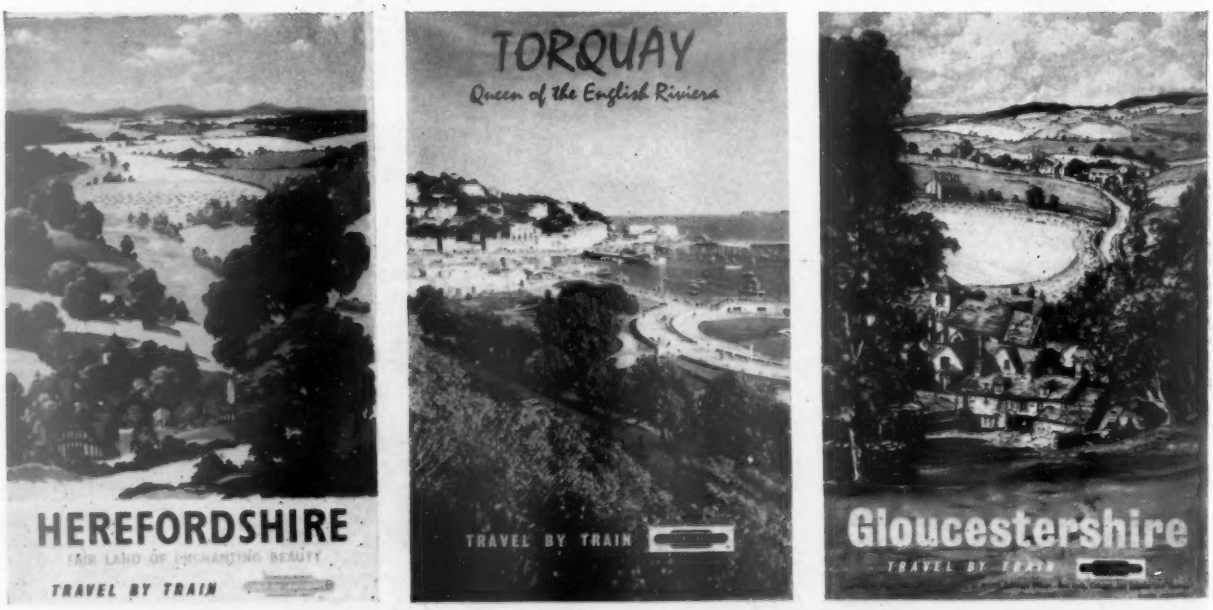
"The Glorious Thames" was printed by the Baynard Press—47,000 copies for general distribution this year, and 10,000 more for North America. "South Wales" was printed by C. M. D. Printers Limited of Chatham—42,000 copies for general distribution this year, and 10,000 for North America; Waterlow & Sons Limited printed 32,000 copies of "The Shakespeare Country" for general distribution in 1960 and a further 50,000 for North America. "The Cambrian Coast" was printed by the Liverpool Printing & Stationery Co. Ltd.—32,000 for general distribution this year, and 10,000 for North America.

The three lower illustrations are reproductions of posters printed in eight, seven, and eight colours respectively.

A. J. Wilson designed the Herefordshire poster, 2,000 copies of which were printed by the British Colour Printing Co. Ltd. This poster will be displayed throughout British Railways for two years.

The Torquay poster was produced by the Public Relations & Publicity Department from a transparency supplied by the Torquay Corporation Publicity Department and is the first pictorial poster to be printed by the Region from a transparency. It was made by the Haycock Press Limited, and 2,000 copies will be used throughout British Railways for a two-year display.

The Gloucestershire poster was designed by Claude Muncaster and printed by Charles



New posters for Herefordshire, Torquay, and Gloucestershire

Cover of one of the five new area folders

& Read Limited : 2,250 copies will be used over two years throughout British Railways, and the poster will also be shown in American and Canadian offices.

New Power Signalbox at Manchester Victoria

Work is now advancing on the foundations for a new power signalbox to be erected at Manchester Victoria, British Railways, London Midland Region, and the structure will be ready for the signal equipment to be installed in about three months' time.

The ground floor will have a number of staff amenity rooms; the first floor will house the relay equipment and will be mechanically ventilated with filtered air; on the second floor will be the control room and also a staff messroom. An independent building to the west of the signalbox will house a stand-by power house, a workshop and an unroofed compound for compressed air cylinders and water tanks. The control room will be constructed with a changing ceiling level to take a high illuminated indicator panel. The panel will be shielded from all direct sunlight and illuminated from a low-level source on the sloping ceiling. Incorporated with the control room will be a station announcer's cabin.

The signalbox and stand-by power house will be steel-framed structures with welded connections; floors will be precast concrete and the roofs sheet steel decking; cladding behind the columns and between the rolled steel channels will be 1½ in. panelling, faced with polyester fibre-glass on a honeycomb backing. The box will be built over the Victorian brick arches at the edge of the River Irk, and it will be the prototype of a new range of power signalboxes which will be constructed as a part of the London Midland Region modernisation plan.

The structure has been designed in the office of the London Midland Region Architect, Mr. W. R. Headley, under the direction of Mr. A. N. Butland, Chief Civil Engineer, London Midland Region. The general contractor is E. B. Jones & Rawlinson Limited, of Delford.

Intensive Engineering Works on G.N. Main Line

One of the largest 24-hr. programmes of civil engineering work to be carried out so far this year, in connection with the improvements to the main line of British Railways, Eastern Region, Great Northern Line, from Kings Cross to the North, was executed on Sunday, April 3. Four hundred men, a 45-ton breakdown crane, a 10-ton steam crane, a 25-ton road crane and special track-laying equipment will be at work throughout the day at various points between Peterborough and Barkston, north of Grantham.

The main features of the work were: (*a*) demolition of a 72-ft. steel passenger bridge spanning three tracks at the disused Essendine Station (now closed); erection of concrete footbridge over the track at Tallington, with spans of 29 and 48 ft.; erection for the local authority of a new tubular steel bridge, with spans of 42 and 48 ft., carrying a water main over the rail track at Etton; extensive track re-laying and re-ballasting work over a total distance of two miles, mostly between Grantham and Barkston; and repairs in the Peascliffe Tunnel, north of Grantham, including renovation of the 40-ft. smoke shaft.

Bridges

The first stage of the bridgework began shortly after midnight with the demolition of the bridge at Essendine. When this task was completed, by about 6 a.m., the breakdown crane moved south to Tallington to put up the main span of the new bridge. The work here had already begun with the erection of the other parts of the structure by the 25-ton road crane. The Etton bridge was the last to be erected. Both the new bridges afford clearance for future a.c. electrification.

Trackwork

A principal feature of the trackwork completed was the laying of a 500-yd. length of continuous welded rail between Stoke Tunnel and Highdyke. Other work included ballast cleaning operations on the slow lines between Peterborough and Werrington Junction; re-railing of 300 yd. of track at Helpston on the main line; re-ballasting on the down line at Tallington and preparatory work for quadrupling at this point. Between Grantham and Peascliffe prefabricated track will be laid over a ¾-mile stretch using a special track-laying machine.

The only alteration to train services between Kings Cross and the North was a diversion *via* Sleaford or Allington. Trains could not, therefore, call at Grantham throughout the day. Special bus services were arranged accordingly.

Staff and Labour Matters

Railway Shopmen's Claim

At a meeting of the Railway Shopmen's National Council on April 1, further consideration was given to the application of the employees' side of the council for a substantial increase in the rates of pay and a reduction in the weekly hours of work of railway shopmen.

A lengthy discussion took place, following which the trade union representatives stated that they would report back to their executive committees in regard to the position which had been reached.

A British Transport Commission spokesman subsequently said:—

" The report of the Guillebaud Committee has not covered, and was never intended to cover, the staff of railway workshops. In July, 1958, the B.T.C. reached agreement with the trade unions concerned on a 3 per cent

Placing in position section of footbridge at Tallington. Re-ballasting of down line and preparatory work for quadrupling in background

increase in wage rates for railway shopmen, subject to the position of the railway shopmen being reviewed, as might be necessary, in the light of future developments, including the proposed review of wages in the railway industry. Under that agreement, and not as an application of the Guillebaud Committee report, the B.T.C. has made an offer of a 5 per cent increase in basic wage rates, back-dated to January 11, 1960, to railway shopmen."

Questions in Parliament

Railway Planning Board

Mr. J. Grimond (Orkney & Shetland—Lib.) asked the Minister of Transport on March 30 if he would announce the names of the members of the new railway planning board; and if it was to be permanent.

Mr. Grimond also asked what were the present considerations which prompted the Government to set up a planning board to advise on the size, shape, and pattern of railways and the future prospects of traffic.

Mr. Ernest Marples, answering both questions together: The considerations prompting the setting-up of this body were fully explained by the Prime Minister in his statement of March 10. I hope to be able to announce the composition and terms of reference of the body very shortly.

Mr. Grimond: Was the B.T.C. consulted before this proposal was made? If so, did the Commission commend it? Ought there not to be people in the Ministry or in the B.T.C. doing this sort of planning without the need of a new board? If the new board is to have these very wide terms of reference, does the Minister think that it can give a once-for-all decision on these matters?

Mr. Marples: The terms of reference have not been announced, and the hon. Member does not know what they are.

Mr. Grimond: The Joint Parliamentary Secretary (Mr. John Hay) stated them.

Mr. Marples: The actual terms of the reference have not been announced. The Chairman of the British Transport Commission (Sir Brian Robertson) was in almost daily consultation with me, and he agreed with the procedure which the Government is following.

Mr. Wedgwood Benn (Bristol S.E.—Lab.): Will this planning board be charged with the responsibility of studying the future of transport as a whole, or will it be confined to the railways? Certain simple, clear-cut decisions, such as the freedom to develop sites for car parking and similar purposes, and the Victoria tube line, need not await another commission inquiring into the management side of the railways.

Mr. Marples: If the hon. Member thinks that matters connected with the railways are very simple, he ought to think again. It would be better to wait until the terms of reference are announced before answering supplementary questions about them.

Mr. Grimond: The Joint Parliamentary Secretary gave the House certain information about the terms of reference in a recent debate (March 23). Is this information wrong?

Mr. Marples said that reference to *Hansard* would probably show that the words "terms of reference" were never used by Mr. Hay. All he did was to give a little information to the House in the course of the debate. The House ought to wait until the names of the members of the board and the terms of reference were announced.

Mr. A. Manuel (Central Ayshire—Lab.) asked whether there would be an opportunity to debate any decisions reached by the planning board before they were automatically put into operation by British Railways.

Planning Board Decisions "Advisory"

Mr. Marples pointed out that it was stated in the debate that the decisions of the planning board will be advisory to the Government, and that it would be the Government's duty to decide what action to take.

Channel Tunnel Study Group Report

Mr. E. L. Mallalieu (Brigg—Lab.) asked the Minister of Transport on March 30 for a statement on Government policy as to the proposed Channel Tunnel.

Mr. Marples: No. I have only just received a copy of the International Study Group report.

Mr. Mallalieu asked whether if the report was favourable, Government intentions towards the project also would be favourable. Links, moral and spiritual, between Britain and the Continent, and particularly with France, were very desirable, and the tunnel would be such a link.

Mr. Marples replied that anything that could increase the friendship between Britain and Europe was desirable. He asked for time to look at the report.

Mr. R. Gower (Barry—C.): Do not the proposals for the tunnel envisage only a railway? If such a vast project is eventually to be contemplated, should it not include a road as well?

Mr. Marples: I would rather not discuss the report until I have studied it closely. It envisages two tunnels, one each way, for railways, but not a roadway. The reason, I understand, is technical—the difficulty of ventilation.

Elimination of Level Crossings

Vice-Admiral Hughes Hallett (Croydon S.E.—C.) asked the Minister of Transport on March 30 what was his present policy as to replacing level crossings by road bridges; what arrangements he made for initiating such replacements; and by whom the cost was borne.

Mr. Marples: The elimination of level crossings, where they cause serious delay to traffic, is an important factor in the selection of schemes for road improvement, and as the road programme develops they will be progressively replaced. The initiation of schemes rests with the highway authority concerned, which also bears the cost, apart from any contribution made by the B.T.C. in respect of the relief from its obligation to maintain and operate the crossing. The Government meets the whole of the highway authority's liability on trunk roads and makes grants towards it for approved schemes on classified roads.

Vice-Admiral Hughes Hallett asked for a more ambitious programme, with a view to trying to eliminate level crossings in the next three or four years, and for legislation, if necessary, to ensure that this could be borne as a road improvement.

Mr. Marples: I agree that it is desirable to eliminate as many level crossings as we can, but some are more important than others. Abolition is desirable on three grounds: it eliminates delays in road traffic; it saves money for the railways; and it reduces accidents.

Car Parks on Railway Property

Mr. R. Russell (Wembley S.—C.) asked the Minister of Transport on March 30 to state approximately how much space in the Greater London Area was taken up by railway lines and railway works of various kinds; and what attempts were being made to obtain suitable areas of this land for car parking.

Mr. Marples: I have no figures for the Greater London Area. My information is, however, that railway property within the County of London is conservatively estimated to occupy some 3,350 acres. The London Travel Committee is doing all it can to encourage provision of car parks at stations in London. The number of car spaces at stations in the London area has increased from 6,000 to 8,300 since 1955, and plans have been made to increase the number to 9,500 in the near future.

Mr. Russell said that there was also a need for car parks at stations. An enormous amount of space was occupied by the railways, not entirely by lines but by yards, which might be used for car parks.

Mr. Wedgwood Benn (Bristol S.E.—Lab.): This is exactly one of those points on which a decision could be reached immediately. It is not necessary to wait six or eight months for a decision by the planning board.

Mr. Marples: It is not a question of waiting for a decision from the board. Where the Commission can do this without legislation, it is free to do it now. If legislation is needed, the House knows that it takes some time to get it through. If the board which is to advise the Government decides that legislation is required in that respect, we shall put forward that legislation.

L.T.E. Peak Hour Traffic

Mr. M. Lipton (Brixton—Lab.) asked the Minister of Transport on March 30 what the result had been of the London Travel Committee campaign to stagger working hours.

Mr. Marples: Since 1957 some 240 firms have made arrangements for staggering the hours of more than 32,000 staff. To this the London Travel Committee has made a substantial contribution and their campaign continues.

Mr. Lipton: The London Travel Committee, one of the many committees with which the Minister surrounds himself, has been engaged in this campaign for two years and 30,000 out of the 1,100,000 people who pour into London daily is a very small percentage.

Mr. Marples: There is no quick method of implementing the staggering of hours. Schemes must be worked out on a local basis. We cannot dictate to people or force them to stagger hours.

Rail Links with London Airport

Mr. G. R. Chetwynd (Stockton-on-Tees—Lab.), asked the Minister of Transport on March 23, what consideration he had given to the proposal to establish a direct express rail link from the B.O.A.C. terminal at Victoria to London Airport.

Mr. Ernest Marples, in a written answer: I have considered this proposal in assessing the communications between central London and the airport. Very substantial improvements in communication by road have been made and more are projected. When they are completed there will be excellent road access to the airport.

Any decision about a rail link would have to take into account the considerations mentioned by the Prime Minister in his statement on March 10 on the B.T.C.

Monorails have also been suggested, but so far definite proposals have not been put to me. The cost of a rail link and road improvements are not comparable, because roads are multi-purpose, while a rail link would serve only the airport. The journey time in each case would not be very different when the road improvements are completed.

Schoolchildren's Fares

Mr. David Griffiths (Rother Valley—Lab.), asked the Minister of Transport on March 23, to give a general direction to the B.T.C. for adult fares not to be charged to

schoolchildren until they had attained the age of 15 years.

Mr. John Hay, Parliamentary Secretary, in a written answer: No. This is a matter for the commercial judgment of the Commission. The B.T.C. Passenger Charges Scheme contains provisions enabling reduced fares to be charged for young people aged 14–18 for travel to and from schools and other educational establishments.

Parliamentary Notes

Financing the B.T.C.

The Chancellor of the Exchequer, Mr. D. Heathcoat Amory, in his Budget statement on April 4, spoke of the financing of the British Transport Commission as one of two matters (the first was the increasing cost of the National Health Service) " which cause me particular concern, and which I have had much in mind in formulating my budget proposals." He planned to change the method of financing it.

Speaking of the finances of the British Transport Commission, he said:

" I have to mention here, first, the prospect of higher expenditure and, secondly, an important change which I propose in the method of financing the Commission.

" In the calculations which I have so far made for the coming year I have included below the line a sum of £90 million for the expected deficit of the Commission in the year. I have, however, to bear in mind that, although this figure includes the cost of the recent 5 per cent interim increase in railway wages, it includes nothing in respect of any further increases which may result from the negotiations now in progress on the Guillebaud Report.

" The deficits of the Commission have, since the passing of the Transport (Railway Finances) Act, 1957, been financed by advances from the Exchequer. These have been on the basis that the Commission would eventually make profits out of which it could both pay interest on the advances and repay the principal. For this purpose, the Treasury was given borrowing powers by Parliament. It has become apparent that the prospects of the railways and the Commission are not now such as to justify the continued financing of the deficit by repayable advances.

Legislation Next Session

" The treatment of such advances as have already been made, and the question of the future capital structure of the Commission, are matters which will be decided by the Government in connection with the measures foreshadowed in this House on March 10 by the Prime Minister. The working out of detailed proposals, and the preparation of the necessary legislation, will take time, and the Bill cannot be brought in until next session. I have nevertheless considered it right to anticipate this in my budget so far as concerns the method of financing the British Transport Commission in the coming year.

" For the purposes of my budget calculations, I am accordingly transferring the sum of £90 million from below the line to above the line. The effect of this is that the amount of the deficit will have to be met from revenue, a sharp reminder of the harsh realities of a disturbing situation. The Minister of Transport (Mr. Ernest Marples) will in due course submit a Supplementary Estimate for the necessary amount.

" This important change reduces the above-the-line surplus by £90 million to £282 million and the below-the-line deficit by the same amount to £613 million, leaving the same figure of £331 million to be met by borrowing."

Contracts and Tenders

Diesel crane order for Cowans, Sheldon & Co. Ltd.

Cowans, Sheldon & Co. Ltd. has received an order for two diesel railway wrecking cranes from the Quebec Cartier Mining Company of Montreal, Canada. The wrecking cranes are of 250-ton and 150-ton lifting capacity, and are to be delivered at the end of this year to Port Cartier, on the north shore of the St. Lawrence Estuary, where the Quebec Cartier Mining Company is now constructing a new railway northwards for some 190 miles to the area of Lac Janine. This railway is being specially constructed for the purpose of transporting iron ore from the mines near Lac Janine to the ocean port of Port Cartier. The cranes are of the largest of their type which have been built anywhere in the world, and have been specially designed for operation in the severe low temperature conditions which exist in the area of Quebec during the winter months. Both cranes will be powered by Rolls-Royce diesel engines. The value of the order for the cranes and their associated equipment approaches some £175,000.

The Export Services Branch, Board of Trade, has received calls for tenders as follow :—

From Greece

99 tons of superheated cylinder oil.

The issuing authority and address to which bids should be sent is the Hellenic State Railways, 12b, Polytechniou Street, Athens. The tender No. is 4558. The closing date is April 12, 1960. The Board of Trade reference is ESB/8596/60.

20 diesel shunting locomotives.

The issuing authority and address to which bids should be sent is the Greek State Railways, 126, Polytechniou Street, Athens. The tender No. is 4563. The closing date is May 5, 1960. The Board of Trade reference is ESB/8964/60.

10 diesel railcars.

The issuing authority and address to which bids should be sent is the Greek State Railways, 126, Polytechniou Street, Athens. The tender No. is 4562. The closing date is May 7, 1960. The Board of Trade reference is ESB/9258/60.

20 passenger coaches complete with spare parts.

The issuing authority and address to which bids should be sent is the Greek State Railways, 126, Polytechniou Street, Athens. The tender No. is 4564. The closing date is May 3, 1960. The Board of Trade reference is ESB/9259/60.

From Ceylon

9 items of steel flat bottom rails and fastenings.

The issuing authority is the Crown Agents for Oversea Governments & Administrations, 4 Millbank, London, S.W.1, who are acting as purchasing agents. The tender No. is EC3—Ceylon Railways/2555. The closing date is May 4, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/8521/60.

From South Africa

7 items of stainless steel sheets, rounds, and tubing.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed " Tender No. H.4310: Stainless Steel Sheets, Rounds and Tubing," should be addressed to the Chief Stores Superintendent, S.A.R., P.O. Box 8617, Johannesburg. Local representation is essential. The closing date is April 26, 1960. The Board of Trade reference is ESB/8559/60.

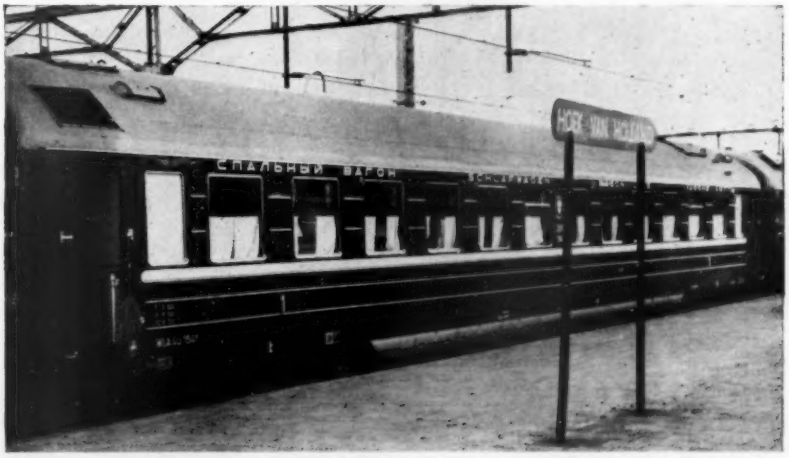
From Sudan

1 electric motor driven centrifugal pump capable of pumping out drainage water soiled with furnace oil and boiler sedements, with an output of 10,000 gal. per hr. and suitable for a suction head of 15 ft. and a delivery head of 25 ft. from the pump centre line, for operation on 415V. three-phase 50 cycles a.c.

The issuing authority is the Stores Department, Sudan Railways. Bids should be addressed to the Office of the Controller of Stores, Atbara, accompanied by a 2 per cent deposit. Prices should be quoted on both

Hook-Moscow Through Sleeping Cars

(*See editorial comment on page 410*)



Dual-gauge sleeping car at Hook of Holland Station, Netherlands Railways

f.o.b. and c.i.f. Port Sudan basis. The tender No. is 2144. The closing date is April 28, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/8716/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

Notes and News

Institute of Transport Annual Dinner.—The annual dinner of the Institute of Transport will be held at the Dorchester Hotel, Park Lane, W.1, at 8 p.m. on April 28. The President, Mr. Reginald G. Grout, will receive members and guests from 7.15 to 7.45 p.m.

Re-signalling of L.T.E. Bow to Upminster Line.—The track feed cases illustrated in the article in our January 29 issue on re-signalling between Bow and Upminster of the London Transport District Line, were manufactured by Bernard Collins Limited.

Railway Facilities in Construction of Steelworks.—When the site was selected at Llanwern (Mon.) of the new steelworks and rolling mill of Richard Thomas & Baldwins Limited, British Railways, Western Region, made immediate plans for movement by rail of materials for the project, especially in view of the decision to accelerate the constructional work and bring the mills into production 18 months earlier than originally planned. A temporary connection for a private siding was laid on July 5, 1959. A permanent connection was subsequently constructed on January 10 last, to allow the contractors to proceed with laying out the internal lines. Although general construction is proceeding, the siding to serve the works is not yet complete. This necessitates transfer of large quantities of material from rail to road for delivery. The yard at Lliswerry was chosen as the railhead for this traffic which at present exceeds 2,000 tons weekly. It consists mainly of 40-ft. concrete piles, 60-ft. steel rails, and 40-ft. bundles of steel reinforcing rods. To handle them, British Railways has provided heavy-duty Freightlifter fork trucks, two of which work in pairs. This method is particularly suitable for pile traffic. New types of material are now being conveyed, including steel sleepers, pile guides, and fishplates (in containers).

Klaxon Limited New Offices.—The London Sales Office of Klaxon Limited, has been moved to 189-191, Drummond Street, London, N.W.1. Telephone: Euston 4102 and 4143.

Motorman Killed in Collision in the Southern Region.—The motorman of the 6.14 a.m. electric train from Holborn to West Croydon, British Railways, Southern Region, was killed when the train collided with the rear of a steam locomotive in fog half-a-mile north of Herne Hill Station, on April 1. The guard of the passenger train, one passenger, and the driver of the steam locomotive were injured, and a signalman suffered shock. They were taken to hospital, but only the driver was detained.

"Assured Arrival Service" in Southern Region.—An "assured arrival service" was inaugurated this week by British Railways, Southern Region, between London and principal centres in Kent, Sussex, Hampshire, and the West Country. Consignments despatched before a given time one day are available at destination for delivery by railway cartage or clearance by consignee the next morning. The facility is given with consignments collected and delivered from stations by traders or by British Railways. Each station has a set time for goods to be handed in.

Formation of Telcon Metals Limited.—British Insulated Callender's Cables Limited has announced the formation of a new company, Telcon Metals Limited. From April 1, 1960, this company, centred at Crawley, assumed responsibility for all the activities of the Metals Division of The Telegraph Construction & Maintenance Co. Ltd. These cover the manufacture of Telcon magnetic materials and other special alloys used in the electrical and engineering industries and also the advanced metallurgical operations associated therewith. In addition to operating the factory at Crawley, Telcon Metals Limited will control the following subsidiary companies: Magnetic & Electrical Alloys Limited, Burnbank, Hamilton, Lanarkshire; Telcon-Magnetic Cores Limited, Chapelhall, Lanarkshire; Temco Limited, Lydbrook, Glos.; and Toolpro Limited, Ilford, Essex. The names of the directors of the new company are recorded in the Personal columns this week.

Pair of Freightlifter fork trucks at Lliswerry yard, Western Region, handling material for construction of Llanwern steelworks

Tilbury–Gravesend Car Ferry Sailings for Easter Period.—British Railways, Eastern Region, announce that during the Easter holiday period, April 11-23, a more frequent service will be provided on the Tilbury-Gravesend car ferry. Vessels will operate a 20-min. interval service daily in each direction from 7.5 a.m. until 11.5 p.m.

B.T.C. Harbour Charges Schemes.—The inquiry before the Transport Tribunal into the Fleetwood, Grimsby, Hull, and Lowestoft Harbour Charges Schemes, 1960, submitted by the British Transport Commission for confirmation by the Tribunal under Section 76 of the Transport Act, 1947, as amended by Section 20 of the Transport Act, 1953, will begin at the Niblett Hall, 3 (North), King's Bench Walk, Temple, London, E.C.4, on May 3, at 10.30 a.m.

Special Train for President de Gaulle.—The special train conveying the President of the French Republic, General de Gaulle, on his State visit left Gatwick Airport Station, British Railways, Southern Region, at 11.45 a.m. on April 5, and arrived at Victoria Station at 12.30 p.m. It was hauled by "West Country" class 4-6-2 locomotive No. 34017, *Ilfracombe*, and consisted of four Pullman cars. The engine bore a symbolic headboard incorporating the French Tricolour.

Opening of Electrical Engineers' Exhibition.—Mr. Reginald Maudling, President of the Board of Trade, opened the Electrical Engineers' Exhibition at Earls Court, London, on April 5. The electrical industry is the country's largest exporter and its sales overseas account for over 10 per cent of the total exports of United Kingdom manufacturers. Over 460 manufacturers have their products and developments on show and the estimated value of the equipment in the exhibition is some £3,000,000. The exhibition closes tomorrow.

Institute of Transport Congress, 1960.—The paper to be read at the Institute of Transport Congress at the Waldorf Hotel, London, W.C.2, on April 27, after the opening of the Congress at 9.45 a.m. by Mr. Ernest Marples, Minister of Transport, will be read by Sir Gilmour Jenkins, lately Permanent Secretary to the Ministry of Transport & Civil Aviation and a Past President of the Institute. It is entitled "The State and transport economics," and will take the place of the paper "Some thoughts on the future of inland transport" which was to have been given by Sir Brian Robertson, Chairman of the British Transport Commission.

Easter Holiday Course for Schoolboys at Doncaster Works.—British Railways, Eastern Region, arranged a short course at Doncaster Works during the Easter holidays to give boys from public and grammar schools throughout the country an insight into the workings of the technical departments of the railways. The course has been held this week in the Chief Mechanical & Electrical Engineer's Department of the Eastern Region at Doncaster. It began last Monday and ends today (Friday). The programme has

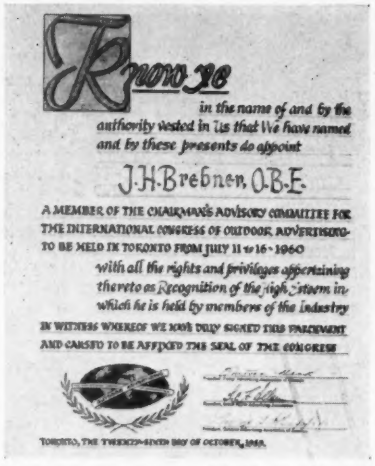
included tours of Doncaster Locomotive and Carriage & Wagon Works, the electric control room at Penistone, the electric train depot at Reddish, and Lincoln and Doncaster Motive Power Depots. Lectures and discussion were included in the itinerary. The programme for today consists of visits to the Drawing Office and Photographic Department of the Chief Mechanical & Electrical Engineer at Doncaster. Ten schoolboys have been taking the course.

Mr. J. H. Brebner's Appointment to International Advertising Congress.—The illustration shows a parchment formally appointing Mr. J. H. Brebner, Public Relations Adviser, British Transport Commission, as a Member of the Chairman's Advisory Committee for the International Congress of Outdoor Advertising which is to be held in Toronto, July 11-16. As recorded in our March 11 issue, Mr. Brebner has accepted an invitation from the organisers of the Congress to be Principal Speaker and Co-ordinator of the Public Relations Session.

Sulzer Rail Traction Diesel Engine Deliveries.—During 1959, Sulzer Bros. (London) Ltd. delivered to British Railways 92 six-cylinder 6LDA28 and three eight-cylinder 8LDA28 rail traction diesel engines built by Vickers-Armstrongs (Engineers) Ltd. These represent a total of 111,370 h.p. for British Railways locomotives of Types " 2 " and " 3 " power categories. Production is at the rate of 15 engines a month, an increase of three a month since September, 1959, when the one-hundredth Vickers-built unit for British Railways was completed.

Civic Send-offs for Edinburgh-Aberdeen 3-hr. Expresses.—The Lord Provost of Aberdeen, Mr. George Stephen, flagged away at 7.30 a.m. on April 4, the first diesel-hauled 3-hr. express from Aberdeen to Edinburgh. He was accompanied by Colonel D. H. Cameron of Lochiel, Chairman of the Scottish Area Board of the British Transport Commission, Mr. James Ness, General Manager, Scottish Region, British Railways, and Mr. J. H. Young, District Traffic Superintendent, Aberdeen. At Edinburgh Waverley, on the same day the Lord Provost, Sir Ian A. Johnson-Gilbert, flagged away at 8.5 a.m. the first similar express train from Edinburgh to Aberdeen. He was accompanied by Sir Hugh Rose, Member of the Scottish Area Board, Mr. G. W. Stewart, Assistant General Manager, Scottish Region, and Mr. J. M. Fleming, Traffic Manager designate (East Coast Division). Afterwards they inspected the new diesel service from Edinburgh to Kirkcaldy and Dunfermline. Editorial reference to these services was made in our March 25 issue.

N.E. Region Study Courses for Schoolboys.—During the period April 4-12, parties of public and grammar schoolboys are taking short study courses in the North Eastern Region of British Railways. The boys see for themselves the many careers now open to them on British Railways. One party, with Darlington as its base, is visiting railway installations at Darlington, Shildon, York, South Gosforth, and Thornaby and studying mechanical, electrical and carriage and wagon engineering. The second party is based at Whitley Bay and is studying the working of the Traffic Department, covering commercial and operating activities. This party is visiting stations, marshalling yards, signalboxes, and depots in the Newcastle area. The third party, working from York, is studying the work of the Chief Civil Engineer's Department, e.g., the maintenance and repair of the permanent way, bridges and viaducts, coal shipping staiths, and the complete renewal of rails, switches and crossings. Visits by boys in this party include engineering installations in course of construction. The fourth party, based at York, is studying the work of the Signal Engineer's Department. This course includes an explanation and demonstration of train control by modern signalling methods. Visits are being made to signalboxes and new signalling and telecommunications installations. Besides seeing practical demonstrations the boys also receive instruction by means of talks and films. The visits have been arranged in conjunction with the Public Schools Appointments Bureau and the Central Youth Employment Executive of the Ministry of Labour.


Know ye

in the name of and by the authority vested in Us that We have named and by these presents do appoint

J. H. Brebner, O.B.E.

A MEMBER OF THE CHAIRMAN'S ADVISORY COMMITTEE FOR THE INTERNATIONAL CONGRESS OF OUTDOOR ADVERTISING TO BE HELD IN TORONTO FROM JULY 11 to 16 - 1960

with all the rights and privileges appertaining thereto as Recognition of the high esteem in which he is held by members of the Industry

IN WITNESS WHEREOF WE HAVE DULY SIGNED THIS PARCHMENT AND CAUSED TO BE AFFIXED THE SEAL OF THE CONGRESS

TORONTO, THE TWENTY-SIXTH DAY OF OCTOBER, 1959.

Parchment appointing Mr. J. H. Brebner, as a member of the Chairman's Advisory Committee, International Congress of Outdoor Advertising.

Railway Bridge Collapses on Line.—A bridge over British Railways, London Midland Region, main line at Standon near Stafford collapsed on to the track on April 5. A Camden-Glasgow goods train ran into the debris and the locomotive was derailed. The driver and fireman suffered shock, but were not injured. The bridge was under-going reconstruction for the electrification scheme.

British Wagon Co. Ltd. Results.—The net profit of the British Wagon group for 1959 was £369,243 (£261,118) and the dividend was 12½ per cent (11¼ per cent equivalent). Fixed assets totalled £606,168 (£485,373). Current assets of £21,301,683 (£16,836,519) included hire-purchase agreements for vehicles, plant and machinery of £18,621,683 (£13,879,833) after deducting £2,358,996 (£1,534,432) deferred income, Current liabilities amounted to £13,185,865 (£8,947,132).

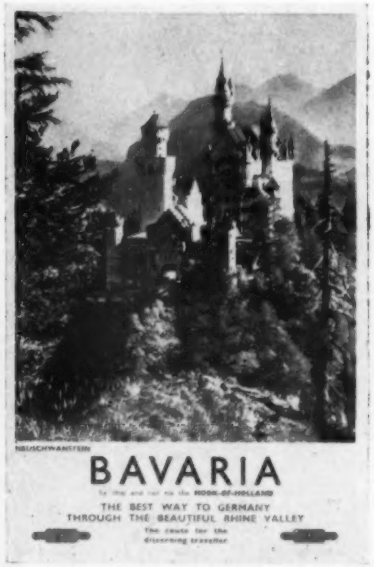
Mather & Platt Limited Results:—The turnover for 1959 of Mather & Platt was higher than for the preceeding year, but the profit was again affected by prices reduced to meet competition. The net profit brought into account at £810,000 was £100,000 more than last year but half this increase is due to over-provision of tax in the 1958 accounts, as in the subsequent Budget the standard rate of income tax was reduced. With the balance brought forward from last year a total of £960,000 was available and the directors recommended a final dividend of 8 per cent which, with the interim dividend already paid, made a total of 11 per cent for the year, which is slightly more than for 1958.

" Transad " Expenditure Figures for 1959.—British Transport Advertising, the commercial advertising service of the British Transport Commission, recently published detailed figures of the amounts spent on advertising sites during 1959. For the first time, receipts from a single product group have been analysed in detail. British Transport Advertising sites have always been especially popular with manufacturers of alcoholic drinks and the £354,000 spent by its group in 1959 is analysed to show separately how much was spent on advertisements for beer, wines and spirits. The greatest proportion, £224,000 (64 per cent) was devoted to advertisements for beer, followed by £104,000 (29 per cent) for spirits, and £26,000 (7 per cent) for wines. Altogether, 31 major business or product groups are included in these figures.

Increase in Railway Freight Traffics.—British Railways freight train traffic totalled 4,943,000 tons during the week ended March 20, a rise of 150,000 tons compared with the corresponding week last year. General merchandise rose by 56,000 to 800,000 tons; minerals were 59,000 tons higher at 1,110,000; and coal and coke rose by 36,000 tons to 3,025,000. Livestock decreased by 1,000 tons to 8,000 tons.

Sefton Park Station to Close.—Sefton Park Station between Liverpool Lime Street and Runcorn, British Railways, London Midland Region, will be closed to all traffic from May 2. Passengers will book to Mossley Hill or Liverpool, according to direction of travel, and thence by buses of Liverpool Corporation Transport. Parcels and passenger train merchandise will be dealt with at Liverpool. Freight train traffic is not dealt with at Sefton Park.

Eastern Region Pictorial Posters.—Two new double royal posters have been produced by British Railways, Eastern Region, for exhibition in stations and offices. That of Bavaria, shown in the illustration, was reproduced from a colour transparency. It is the first Continental poster issued by the Eastern Region since the war. The subject, Neuschwanstein Castle, is associated with King Ludwig II of Bavaria. The other poster, " Service to Industry," features one of the varied traffics handled by British Railways: frozen foods. Six colour transparencies show stages in the preparation and transport of foods. The transparencies are separated by divisions with a railway track



Neuschwanstein Castle, Bavaria, shown in the first Continental poster issued by the Eastern Region since the war

motif. This poster was designed by Advertising Publicity Techniques Limited. Both were reproduced in six-colour photo-lithography by Jordison & Co. Ltd., Middlesbrough.

Rhu Station Re-opened as a Halt.—Rhu Station on the West Highland Line of British Railways, Scottish Region, was re-opened as an unstaffed halt on April 4. The service is provided by the Craigendoran-Arrochar diesel railbus.

G. D. Peters & Co. Ltd. Deficit.—G. D. Peters & Co. Ltd. sustained a net loss of £14,603 in the year ending December 26, 1959, compared with a profit, after tax, of £101,698 and the dividend is halved to 5 per cent. The directors feel justified in recommending a reduced dividend having regard to the substantial reserves built up out of past profits. Their hope is that the present setback in the company's affairs is of a temporary nature only and will be overcome by reason of steps taken to recoup current losses and to develop additional products which, it is anticipated, will prove remunerative in the future.

General Refactories Limited Improved Trading.—Mr. R. A. Kirkby, Chairman of General Refactories Limited, has reported that the demand for many of the company's products is now back to, or even in excess of, the peak levels of 1957. Capital expenditure in 1959 was at a lower level than in recent years, as in face of the uncertain market conditions which existed for most of last year, the Board's policy was not to enter into any major capital commitments. With the future much clearer, certain important projects have been started, including the provision of a tunnel kiln at Glenboig which will make possible the production of firebricks of substantially improved quality. All capital projects at present contemplated can be financed from available resources. The group net profit for the year ended December 31, 1959 rose from £303,471 to £408,229 and the dividend is maintained at 20 per cent.

Forthcoming Meetings

April 8 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Paper on "The Norfolk coast and Cromer expresses of the G.E.R.," by Mr. B. D. J. Walsh.

April 9 (*Sat.*).—Railway Students' Association. Visit to Peterborough and Cambridge. Leave Kings Cross Station by 8.20 a.m. train.

April 9 (*Sat.*).—Permanent Way Institution, East Anglia Section, at Cambridge, at 2.15 p.m. Paper, illustrated, on "The reconstruction of Temple Mills Marshalling Yard," by Mr. E. R. Newens, Assistant District Engineer, Stratford, Eastern Region.

April 11 (*Mon.*).—Historical Model Railway Society, at Caxton Hall, Westminster, S.W.1, at 7 p.m. Paper on "The history and characteristics of the 3/16 in. scale," by Mr. R. S. Garlick, and the members of the "S" Gauge Society.

April 11 (*Mon.*).—Institute of Traffic Administration, Birmingham Centre, at the Cosmopolitan Club, Fore Street, Birmingham. Discussion on recent transport legislation."

April 12 (*Tue.*).—Institute of Transport, Metropolitan Graduate Society at 80, Portland Place, W.1, at 5.45 for 6.15 p.m. Transport forum.

April 14 (*Thu.*).—Permanent way Institution, York Section, in the Railway Institute, York, at 6.45 p.m. Paper on "The duties of a railway medical officer," by Dr. S. Hulme, Medical Officer, Southern Region, British Railways.

April 19 (*Tue.*).—Railway Correspondence & Travel Society, West Midlands Branch, at 46, Holyhead Road, Coventry, at 7.30 p.m. Paper on "The Festiniog Railway," by Mr. W. F. Smallman.

April 23 (*Sat.*).—Permanent Way Institution, London Section. Visit to Pumping Station, Severn Tunnel.

April 25 (*Mon.*).—Institution of Railway Signal Engineers, Bristol Section, at Temple Mead Station, Bristol, at 6 p.m. Annual general meeting, followed by a paper on "Single line working,' by Mr. J. V. Nicholson, British Railways, Western Region.

April 26 (*Tue.*) to April 29 (*Fri.*).—Institute of Transport 1960 Congress in London.

April 26 (*Tue.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Paper on "Steel wheels and tyres," by Mr. C. F. Ryan, and Mr. B. B. Hundy.

April 26 (*Tue.*).—Railway Correspondence and Travel Society, East Midlands Branch, at the Thurland Hall (Pelham Street entrance), Nottingham at 7.10 p.m. Paper on "London & South Western Suburban," by Mr. R. E. Tustin.

OFFICIAL NOTICES

INTERMEDIATE DRAUGHTSMAN aged 20 to 25 years required. Preferably experienced in the detail of Railway Switches and Crossings, etc. Good salary scale. Assistance with housing given to married man and subsistence allowance paid during probationary period if living away from home. Apply to Chief Draughtsman, Henry Boot & Sons (Railway Engineering) Limited, Callywhite Lane, Dronfield, Near Sheffield.

SALE OF PLANT—WEST AFRICA

The Nigerian Railway Corporation invites tenders for the purchase of: (Reference SDS225)—Timber Treatment Plant at Port Harcourt comprising:—

Motor Driven Sleeper Incisor
Motor Driven Adzing and Boring Machine
Two Treatment Cylinders
Two Feed Tanks
Two Filling Tanks
Cornish Boiler and Chimney
Feed Pump and Tank
Separators, Vacuum Chests and Damps, Pressure Pumps
Piping, Valves, etc.
36 Bogies
Stocks of Creosote in drums.

The plant has been in use for three years and has now ceased operation owing to the completion of treatment projects by the Railway.

The Purchaser would be entirely responsible for dismantling the plant at the site and for removal from Railway premises.

(Reference SDS219)—Electro-Plating Plant at Ebute Metta Workshops comprising:—

Plating Tanks for Chromium Copper and Nickel Plating
Motor Generator Set (A.C. 3-phase 440-volt Motor Driving 100 amps, 6-volt D.C. Generator)
Control Panels, Knife Switches, Rheostats, Anode Rods, Cathode—Pipes
Immersion Heaters
Air Pumps, Fume-Extractor, etc.
Mops and limited range of salts.

The Plant is "as new" not having been brought into use since arrival in Nigeria. There are no fixtures to be dismantled.

Tender Form and further details of the Plant obtainable from the London Representative, Nigerian Railway Corporation, The Adelphi, John Adam Street, London, W.C.2.

Closing date for receipt of Tenders, May 31, 1960.

"PATENT No. 794,542 entitled 'Driving gear arrangement for Six-wheel bogies of Rail Vehicles' is for sale or licence. For details apply to CHATWIN & COMPANY, Chartered Patent Agents, 253, Gray's Inn Road, London, W.C.1."

Railway Stock Market

Business in stock markets is expected to increase now uncertainty about the Budget, which has been a restraining influence in recent weeks, is no longer a factor. Many shares are at levels showing quite attractive yields, and hopes persist of an upward trend in dividend payments, particularly as many companies, it is thought in the City, will have to raise more capital by share issues in the next few months.

With attention centred on industrial shares, business in foreign rails remained on an extremely limited scale. There were a fair number of dealings in Costa Rica ordinary stock, which, however, eased from 30½ to 30, and the first debentures were again quoted at 90 and the second debentures at 94½. Chilean Northern first debentures at 58 were also the same as a week ago, but elsewhere, Brazil Railway bonds were marked back from 8 to 7.

Guayaquil & Quito assented bonds were 77, and Paraguay Central prior debentures 15½.

Antofagasta ordinary stock at 13¾ was unchanged compared with a week ago, but the preference stock moved fractionally lower at 28½; the 4 per cent perpetual debentures were 44½, and the 5 per cent (Bolivia) debentures 100. Elsewhere, International of Central America again had a quotation of $23½, and the preferred kept their improvement to $111½. United of Havana second income stock was 5¾ with business in the consolidated stock at 10s. Quotation for the latter was 10s.—30s.

Canadian Pacifics strengthened to $45, while the preference stock and 4 per cent debentures at 56 and 63⅞ respectively were the same as a week ago. White Pass shares at $13¾ were also maintained on balance.

Nyasaland Railways shares again remained at 10s. and the 3½ per cent debentures held last week's improvement to 51½.

West of India Portuguese capital stock was 112 with the 5 per cent debentures 93½. Barsi ordinary stock was quoted at 17.

Elsewhere, San Paulo Railway 3s. inits eased from 1s. 6d. to 1s. 4½d. Mexican Central "A" bearer debentures kept at 58.

Engineering and kindred shares have attracted more attention, but gains on balance were mostly moderate. Westinghouse Brake strengthened to 51s. 3d., and Associated Electrical to 54s. 7½d., while English Electric at 42s. were firmer after an earlier decline. General Electric were firmer, too, at 39s. 9d. and Crompton Parkinson 5s. shares held their improvement to 13s. 4½d. B.I. Cables rose from 56s. 3d. a week ago to 58s. 6d.

Beyer Peacock 5s. shares, however, lost a few pence at 8s., though elsewhere, G. D. Peters have rallied from 18s. 1½d. to 18s. 9d. Gloucester Wagon 10s. shares remained at 13s., and Birmingham Wagon were again 41s. 3d. with Charles Roberts also the same as a week ago at 14s. 6d. North British Locomotive, however, came back from 11s. 6d. to 10s. 9d. Wagon Repairs 5s. shares were 11s. 3d., compared with 11s. 6d.

Metal Industries were 76s., George Cohen 5s. shares 16s. and Delta Metal 5s. shares 24s. 6d., while among machine tools Asquith 5s. shares firmed up to 12s. and Alfred Herbert rose to 55s. Broom & Wade 5s. shares were 18s. 9d. and Holman Bros. 10s. shares 23s. 3d. Dowty Group 10s. shares were 35s. 6d. and Pressed Steel 5s. shares were 41s.

Pollard Bearing 4s. shares rose from 44s. 6d. to 46s. Ransome & Marles 5s. shares kept at 25s. Guest Keen rose from 90s. 9d. to 92s. on higher dividend hopes and T. W. Ward were good again with a fresh rise from 152s. 6d. to 154s. 6d.